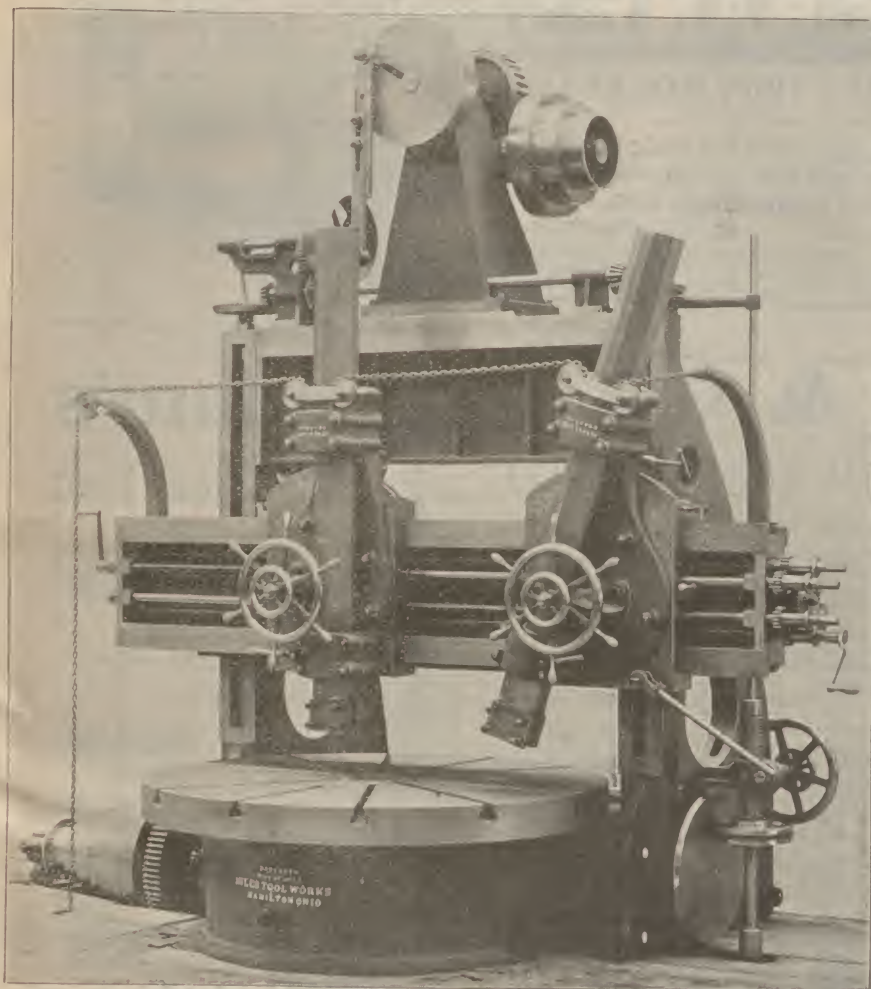


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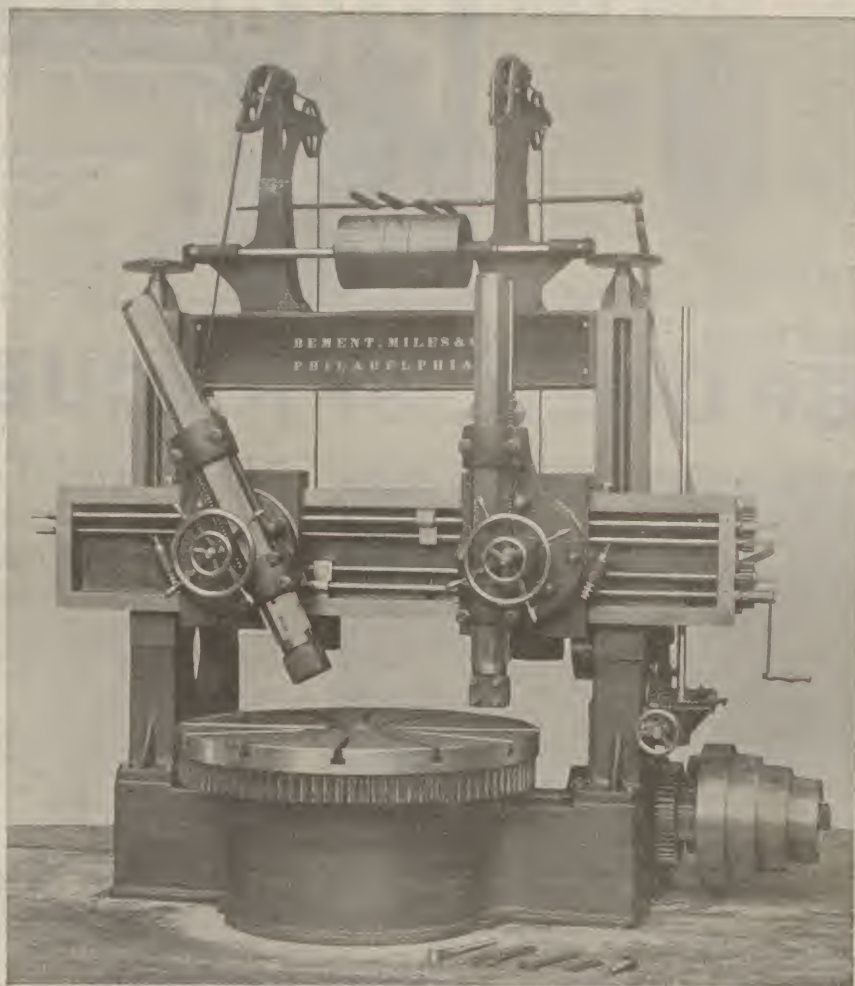


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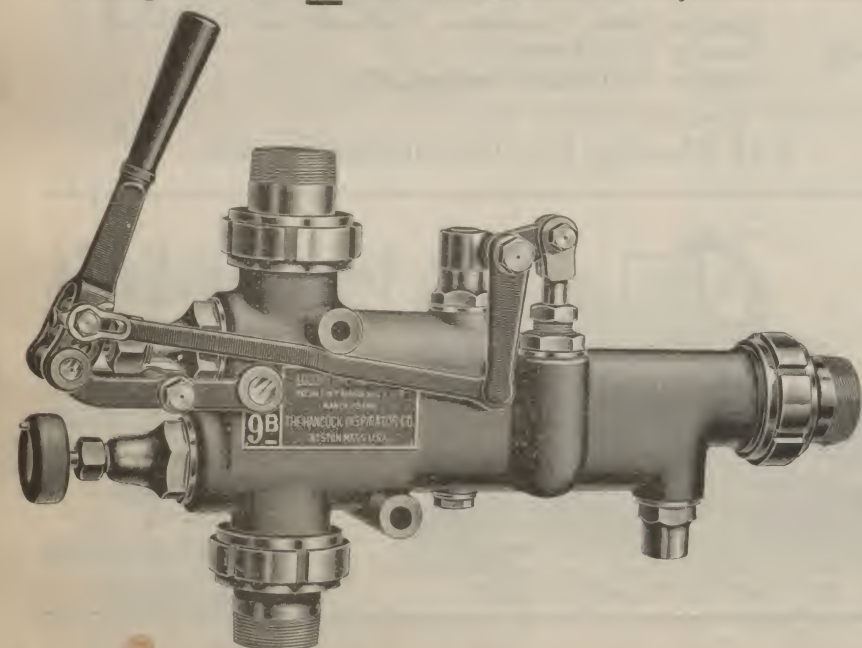
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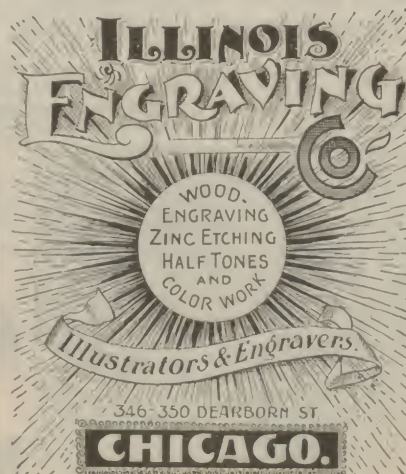
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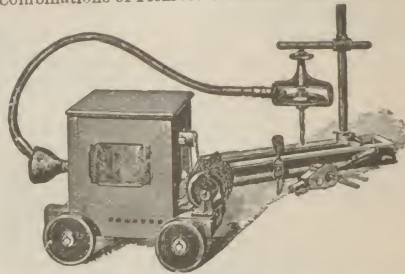
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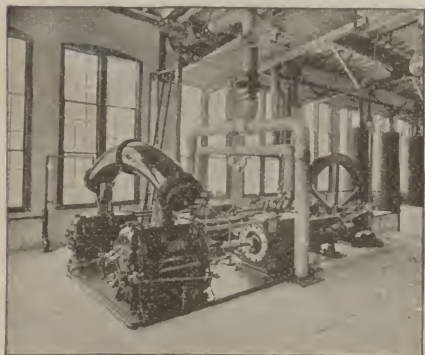
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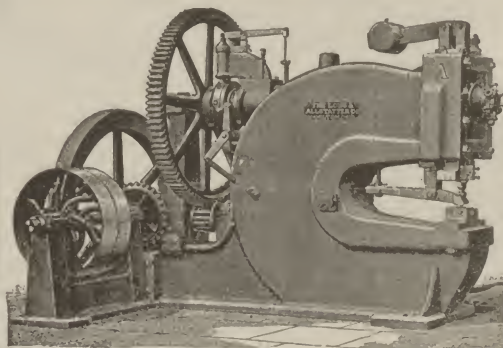
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# THE RAILWAY REVIEW

No. 26.

JUNE 27, 1896,

IVXXX.

**INDIAN RAILWAY EARNINGS.**—The report of the Indian railways for 1895 shows a great record of progress, as over 800 miles were opened for traffic, while nearly 3,800 miles were under construction or sanctioned. The number of passengers carried increased in round numbers by 7,333,000, and the goods traffic by 20,000,000 tons. The net earnings rose 59 lakhs, the total exceeding 14 crores 11 lakhs. The return on capital was 5.78 per cent. Deducting charges for sinking funds and interest on lines under construction, the charge to the state for the whole railway system during the year will be only 76 lakhs, or about half the amount of the preceding year. But for the loss on exchange a handsome profit would be shown.

**A FOUL AIR INDICATOR.**—At the Industrial Exposition at Zurich Switzerland, there is exhibited an air tester which is designed to show whether and in what degree the air in a workshop or other inhabited room is contaminated. The apparatus is described as consisting of an air tight closed glass vessel filled with a red fluid. Through a glass tube that dips into the liquid and is bent at the top a drop falls every 100 seconds on a cord that hangs beneath and that is somewhat stretched by a weight. The fluid from which the drop comes has the property of changing its color by the action of carbonic acid. The more carbonic acid there is in the air the quicker this change in color takes place. If the air is very foul the drop becomes white at the upper end of the cord, while the change of color corresponding to a slight proportion of carbonic acid does not take place till the drop has run further along the cord. The exact condition of the air can be ascertained by observing a scale that is placed alongside the cord and divided into convenient parts, bearing the designations, "extremely bad", "very bad", "passable", "pure".

**A SWISS MOUNTAIN RAILROAD.**—An interesting description has lately been given of the Stanserhorn Railroad—one of the most recently opened of the Swiss mountain railroads. It consists of a series of inclines, each of which is operated by cables driven by independent electric hoisting engines. The current is generated by dynamos driven by turbines actuated by a mountain torrent some five miles distant. This plant also supplies current for lighting the village and hotel, and also for the searchlights on the mountain tops. The road is constructed in three parts, each at an angle with the other, the gradients being in some instances as high as 60 degrees. The passengers are required to dismount twice in each ascent of about 5,000 feet. Two cars are attached to the ends of a pair of wire cables, and are provided with automatic safety devices consisting of rail grippers on one rail. These are thrown into operation by a worm operated by a pair of bevel gears, the driver of which is loose on the axle and is driven thereby by means of a conical friction disc or pulley which is pressed against its counterpart as soon as the tension on the hoisting rope is released. Should the rope break or the strain be released the friction disc grips, and beginning to revolve, drives the worm which spreads the longer ends of the two levers, the short ends of which are wide and flat, and immediately bears against the web of the rail; less than two revolutions of the axles hold the cars in place without chance of slip. This device also prevents the wheels from rising from the rails, as the jaws of the grippers are directly under the heads of the rails. The conductor is supplied with an "electric whip" by which he can immediately communicate with the engineer at the terminal and intermediate stations. This "electric whip" is a brass rod provided with a wooden handle; two insulated wires passing through it connect at all times with the telephone and signals. Thus the car can be stopped instantly by the engineer on signal in case of need, even when out of sight. This mountain road is built on solid masonry from end to end, and in no case is there any possibility of shifting of roadbed. The hillsides are "pallisaded" where the earth is not solid or where forests have been felled, and there are masonry gutters on each side. Numerous paths are carried over and under these roads by stone arches, provisions which, of course, add materially to the first cost. It should be mentioned that in order to keep the safety device in perfect working order tests are made regularly every fortnight.

**SAFETY IN TRAVELING.**—J. Q. Van Winkle, general superintendent of the C., C. & St. L. Ry., is authority for the statement that, in comparison to the number of passengers carried, a much less number, proportionately, are killed than in the days of early railroading, and in case of accident the number of killed and injured is less when compared with thirty years ago. Of course trains are better protected when on the road, and many other things are done at present which prevent accidents, but it is a fact that the passenger equipment of the present day is so much more substantially built, not only the Pullman and Wagner cars, but the day-coaches run in the regular trains. In collisions there is only a little telescoping of the engine with the baggage car, the platforms of the coaches and the entire construction of the coach being so substantial that seldom is there much damage to the coach. He cited as one case an accident on the Illinois Central, just north of Kankakee, when an Illinois Central engine hauling a night

express train, owing to a fog, ran into a freight train ahead, demolishing the caboose and two freight cars, while the cars in the passenger train were, comparatively speaking, not damaged, another engine being attached to it and hauling the train into Chicago as if no accident had occurred. Mr. Van Winkle cited another case on a road running into St. Louis, where the train was derailed and a part of it rolled down an embankment; still the passengers escaped with a few slight bruises. Mr. Van Winkle said the traveling public never stop to think what the roads have done in the last fifteen or twenty years to make fast travel safe and comfortable, not only in improving the roadbed and track, but in the equipment and the methods of handling trains. He did not know of any one thing in which such a revolution had been wrought in the last quarter of a century as in the building of equipment, the safety guards to travel, and general methods of railroading.

**ACETYLENE FOR LIGHTING RAILWAY CARS.**—The Eastern Railway of France has given acetylene a trial in lighting a first-class coach of a Paris-Metz express. The compression of the acetylene was accomplished in a reservoir of similar construction as that of the gas tanks used regularly on this line. It was burned in a small special Manchester burner with an extremely small slit in order to obtain the most perfect combustion. The results of the tests, as stated by the Swiss Builders' Gazette, were as follows: "Twelve litres of acetylene gas was consumed to produce a lighting effect of two carrels, or 18.4 normal candles per hour. If the ton of calcic carbide is valued at 550 francs (\$107.15), the average yield of one kilogramme is calculated at 300 litres of acetylene gas, the cost of lighting would amount to exactly 2 centimes or two-fifths of a cent per burner or one centime per carrel hour. Calcic carbide is being sold by the factory at Neuhausen for 4,000 francs or \$76.30, but its actual yield in gas would be hardly more than 280 litres per kilogramme. In spite of the high price of one cubic metre of acetylene gas which amounts to 1.65 francs or 32 cents, it is evident that this means of lighting can very well stand a comparison with illuminating or oil gas. If the cost of calcic carbide could be reduced by one-third or one-half, which is quite probable, the use of acetylene gas would offer in regard to economy considerable advantages if compared with coal gas. It possesses a 15 times stronger lighting power, while the flame burns much quieter.

**ELECTRIC POWER IN BRASS MILLS.**—The brass mills of Messrs. Kulmiz, of Achenrain, Tyrol, have been utilizing the water power of the Ache, but were frequently embarrassed in winter by the frost. Some months ago Messrs. Ganz & Co., of Buda Pesth, put up an electric plant, which derives its power from the same river, about two miles higher up, where there is always open water. A turbine of 200 horse power drives a 160 horse power dynamo. The wires lead to the works where two polyphase motors, each of 60 horse power have been installed. These motors have for two months been working together with the old turbines. The rest of the power serves for lighting the works and the village of Achenrain. Polyphase installations are no longer exceptional, though this is the first enterprise of this kind in Austria, and they have in this case again proved their capability of adopting themselves to rough variations in the load. Although the current consumption in the mills fluctuates very strongly no complaints have been made about the steadiness of the lamps. The plant has according to the *Zeitschrift für Elektrotechnik*, been running day and night since its installation without any hitch. The same issue gives interesting particulars about the electric transfer tables and cranes in use at the Simmering Government Car Works near Vienna.

**INDIAN LOCOMOTIVES.**—The details of sixteen new Indian locomotives for which tenders have been invited show how nearly the conditions approximate to those obtaining in England. The cylinders are to be 18 in. in diameter, and will be placed inside, the 5 ft. 6 in. gage making this a simple matter. The piston stroke is 26 in., and on the locomotive there are six wheels of 5 ft. 1½ in. diameter, the total wheel base being 15 ft. 6 in. The barrel of the boiler is to be 4 ft. 5 in. inside, and there will be 222 tubes 1½ in. diameter, tested by hydraulic pressure to 600 lbs. The heating surface is 1,282 sq. ft., and the grate area 230 sq. ft. All the steel to be used is to withstand a tensile strain of 25 to 30 tons, with an elongation of 23 per cent in 10 in. The engines are to have tenders with capacity for 2,500 gals. of water, and the area for coal supply is 235 sq. ft.

**BUILDING RAILROADS IN JAMAICA.**—All the stone used by railroads for ballasting purposes in Jamaica is soft rock, and it is all broken up into small pieces by native black women. They sit along the line, upon heaps of broken stone sheltered from the powerful sun's rays by rude shelters of palm leaves, and, day after day, pound away at the soft stone with hammers, breaking it into small fragments. They are paid so much a barrel for the work, and earn from nine pence to one shilling a day, eighteen cents to twenty-four cents. All this ballasting material is distributed along the roadbed by these women, who carry it in small round baskets and trays, each holding from twenty-five to fifty pounds. Not only this, but every mile of railroad in Jamaica was constructed in this manner; and not only is this stone ballast all carried on their heads by these women, but every particle of the material for embankments, and all the gravel and filling material is thus transported. These women seem perfectly happy, and are always talking and laughing. But they will do a wonderful amount of work in a day, and the reason for em-

ploying them is because it is cheaper for the same amount of work done than by any other way.

**EFFECT OF MOVING MACHINERY.**—Not long ago, says J. H. Allen in *Dixie*, I ran across two engines of the same make, running at high speeds near each other, that served as a fine example of the effects of synchronously and intermittent moving machinery. Their speed was not the same and yet was so timed that at half minute intervals their pistons would run in unison. While the strokes were out of beat everything in the engine room would be as quiet as though there was no machinery in motion in the county but when they came together the floor, the foundations and side walls were shaken as if in a tempest. It was merely another exemplification of the effect of synchronous motion that we find in the tramp of soldiers over a bridge, and suggests the disastrous results that would follow the throwing of the shuttles of a weaving room in unison. It should also serve as a warning to those setting engines, and lead them to put those of high speed upon independent foundations set well into the ground so that the effects of synchronous running may be absorbed by the ground rather than communicated to the walls and flooring of the building.

**CHINESE RAILROAD CONSTRUCTION.**—According to the London Financial News, there are three railway lines in progress or under consideration in China, viz: A line from Canton to Peking—a grand trunk railway it is called—is referred to in Sir N. O'Connor's last published report, and in that connection it is stated that Li Hung Chang was establishing large iron works at Nanking, to supplement those already in existence at Hanyang, for the supply of the material for the Canton-Peking undertaking. Peking is the starting point of two of the three new lines, which are described as constituting a railway program. One would run to Tientsin, and its cost is to be a charge on the finances of the Province of Chili, a country of nearly 59,000 square miles, with a population of 28,000,000. A second railway is authorized from Peking to Hankow, on the Yangtze, at a cost of nearly \$10,000,000, but the imperial edict is that this line shall not be built with public money, but out of the sum the emperor's wealthy subjects are disposed to invest in its construction in the hope of future gain. The third line would run from Soochow to Shanghai a distance of 60 miles. Its estimated cost is 2,000,000 taels, and of the three, this route seems to promise the best results from a commercial point of view. But this is the pet scheme of Chan Chih Tung, formerly viceroy of Nanking. He is the nearest approach to a competitor of Li Hung Chang known to the Yamen. He claims that there are or were 2,500,000 taels in the official coffers ready for the work when it is commenced. Whether this statement be true or not scarcely matters, inasmuch as it is improbable that Li Hung Chang, now once more in favor, will advance his rival's prospects at the expense of his own interest in the railways from Peking to Tientsin and Hankow.

## THE MASTER MECHANICS' CONVENTION.

The twenty-ninth annual convention of the American Railway Master Mechanics' Association opened at Congress Hall, Saratoga, at 9 a. m., Monday, June 22, President R. C. Blackall, presiding, with the best attendance yet recorded. The opening prayer was offered by Rev. T. F. Chambers and the address of welcome was given by Mr. C. H. Sturges, mayor of Saratoga. This was followed by the president's address, in which the prosperous condition of the association was shown by the increase of 109 in membership during the year, with a total membership of 683, including representatives from nearly every railroad in North America. The work of the year was characterized by common sense methods, and among the improvements introduced had been the tonnage system of rating locomotives and methods of reducing the non-paying weights of trains. Economy was the word of the day, and while much good had been done, a caution was thought necessary lest penny wise and pound foolish methods should be followed. The best form of economy to be sought was in the line of efforts to surround the men with better influences. The relative merits of different coals constituted an important field for investigation, and with this were classed questions relating to the arrangements and proportions of grates and fire-boxes. Among the improvements in shop practice, air tools, improved machine tools and new appliances were mentioned as having exerted an important influence in locomotive work. The influence of electric traction upon railway questions was briefly referred to and high commendation was given to the good work of the railway clubs. Special mention was made of the excellent work which was being done by Purdue University in connection with improvements in the study of mechanical railway subjects. Appropriate words were spoken with reference to the loss to the association through the death of the following members: A. B. Underhill, C. E. Smart, P. J. Perrin, E. M. Raynor, E. F. C. Davis, Daniel Cox and J. E. Morrell.

After action on the minutes of the previous meeting the report of the secretary was received, in which the fact was stated that the decimal gage adopted last year by the association had been indorsed by



sixty-seven different companies. In the ten years of office of the present secretary the membership had increased from 277 to 683, the figures already stated. The treasurer's report showed a balance on hand of \$813.34, and Messrs. Barr, Setchell and Kenzie were a committee to audit the accounts. After the appointment of this committee an amendment to the constitution was taken up in which a change in the method of selecting the secretary of the association was proposed, making that office appointive by the executive committee instead of the usual method of balloting. The question called out a somewhat sharp discussion, and the amendment was finally carried. Mr. Mitchell offered a resolution placing the subject of the relative danger of boiler explosion with the radial and crown bar types of staying in locomotive construction as the special subject for the noon hour of Tuesday. A resolution was offered by Mr. S. Higgins instructing the executive committee to prepare resolutions similar to those passed by the M. C. B. Association last week expressing the position of the association as being opposed to the introduction of the metric system in this country at any time, and to present them to congress. This motion called out discussion upon both sides and was finally carried. A communication was received from the Master Blacksmiths' Association urging the members of the Master Mechanics' Association to give their assistance to further the work of the former association by helping the members to attend conventions. Mr. Barr bespoke interest in and endorsement of the work of the Blacksmiths' Association. An invitation was then read from the Schenectady Locomotive Works for the association to visit those works, after which the question of the unused scholarships of the association was discussed, and was referred to a committee consisting of Messrs. Waitt, Forsyth, Setchell, Bradley and Sinclair to report on what action should be taken to insure the securing of the full benefits of the scholarships in the technical schools by sons of the members of the association, this committee to report later to the convention.

The reports of the committees were then in order, and upon motion by Mr. McConnell, it was voted to dispense with the usual reading of the papers in full, and to have them presented by brief statement by the chairman. The first report on "Exhaust Pipes and Steam Passages" was presented by Mr. Robert Quayle, and was opened to discussion. Mr. Quayle read the conclusions drawn from the portion of the work at Purdue University, and that done at the Chicago shops of the Chicago & Northwestern Railway, in establishing the data given in the report. These conclusions will be found elsewhere in this issue, together with diagrams, showing the design of stack and the arrangement of the front end appliances which were recommended by the committee. Mr. Quayle in answer to a question explained that the nettings were omitted from the front end of the engine during the tests but that this did not prevent the results from being comparable, one arrangement with another. He also, in reply to a question by Mr. Small, said that the committee could see no reason why the results should not be employed for any ordinary range of cylinder sizes. On the C. & N. W. Ry. two sizes of stacks were used, a 14 in. stack for 17, 18 and 19 in. cylinders, and a 13 in. stack for 15 and 16 in. cylinders. Mr. Mitchell had been using a stack almost identical with that shown by the committee, and employed but one size for various engines. Mr. Barr asked for a statement as to the basis from which the efficiencies of the stacks were taken and it was given as the ratio of back pressure to vacuum. Mr. Barr believed that there was more opportunity for improvement in the design of front ends of locomotives than in any other part. He suggested the continuance of the committee for the purpose of following up the recommendation made by the committee, to the effect that the results of the tests should be tried upon various roads under the direction of the committee for further report at the 1897 convention. The discussion was handicapped by the short time during which the members had been able to study the report and it was ordered that the subject be continued for discussion next year.

The next report was that upon "Counterbalancing Locomotives", which was presented by Mr. E. M. Herr. The report included a recommendation to the effect that the committee should be continued for the purpose of reporting next year upon the results of trials of the methods of counterbalancing suggested by the committee. The points to be given attention in the trials were that the greater the weight upon the truck wheels, the shorter the wheel base, and the length of the engine materially affected the disadvantageous result of overbalancing. Mr. Joughins raised the question as to whether the committee had included all that the necessary information in

its report, because of serious trouble which he had found in the rapid wearing of flat spots in driving wheels in a sandy country. He did not think that the recommendations of the committee would be of value in lessening that trouble, to which Mr. Herr replied by calling attention to the report of the committee on "The Wear of Driving Wheel Tires", in the proceedings of the association of 1895, in which it was shown that flat spots would result from slipping of driving wheels without reference to the manner of balancing and that the remedy for this trouble was in securing proper handling of the engines in starting. Mr. Tracy Lyon asked whether the committee had considered the effect of the speed upon the amount of allowable balance, and the chairman replied that an engine only needed counterbalancing at high speeds, as at these only was damage done by the overbalance and that if this was provided for slow speeds would not cause trouble. The report was also intended to apply to locomotives running without steam. Mr. Leeds had experienced trouble through a lateral kinking of rails due to distributing the balancing equally throughout the wheels of consolidation engines. The throw of the weights caused nosing to the extent of damaging the rails, and it was found necessary to get as much as possible of the balance in the main wheels. The committee was instructed to select roads upon which the experiments were to be tried.

The report of the committee on slide valves was presented by Mr. G. R. Henderson who briefly stated its salient points and the discussion centered upon the effect of the Allen port upon the economical working of engines. Mr. Quereau pointed out that the lead should be less with an Allen ported than with a plain valve on account of the effect of the port upon the admission of the steam. A material increase in mean effective pressure was to be obtained by reducing lead by  $\frac{1}{16}$  in. Mr. Forney spoke highly of the work of the committee as the production of a scientific explanation but raised the question of the difference in the steam consumption in the two forms of valves. This the committee had not attempted to show and Mr. Henderson stated the claim for the Allen valve to be the production of greater piston power, which Mr. Forney believed would result in a gain from the possibility of using a greater ratio of expansion with an improvement in economy. Mr. Wm. Forsyth directed attention to the fact that while the Allen valve had been used for about 20 years no actual experiments had been made which had determined its value with reference to the plain valve for economy in the use of steam. It was important to know about the economy. Mr. Henderson thought that the fact that this valve had twice the speed in opening and closing might be a basis for expecting improvements in economy. Mr. Barr raised the question as to whether the additional steam admitted by the Allen port could be gotten out without high back pressure which would be a loss. The rest of the discussion concerned some details of the diagrams and the first session closed at this point.

The session of Tuesday opened with the election of Mr. Geo. L. Fowler to associate membership and the announcement of the appointment of Messrs. Henderson, Lewis and Gordon as committee on resolutions. An application for membership was received from Mr. E. F. Moore, a mechanical engineer of the railroad commission of the state of Michigan, after which the report of the committee on "Reciprocating Parts" was presented by Mr. H. D. Gordon, an abstract of which will be published in a later issue. Mr. Henderson opened the discussion by a statement of the advantages expected of the malleable iron piston of his design, which was shown in the report. Malleable iron was selected because thin castings could be made more satisfactorily than in steel. Lightness was an important object also. The box form provided a desirable air heat insulation. Mr. Wheeler mentioned a case in which a box piston with a thickness of  $\frac{1}{4}$  in. had given good results. Mr. Vaulain had found difficulty in casting box pistons with uniform thickness of metal in the walls. The question of the advisability of using hollow piston rods was raised by Mr. Herr, and Mr. Henderson reported satisfactory service from a rod which was bored out with a  $1\frac{1}{4}$  in. hole. The high cost of boring the rod was the only objection mentioned to this practice. Mr. Forsyth spoke of piston rod fits in which collars were not used. He had found it necessary to make sure that the metal employed was of high density in order to insure success with this method.

The next subject was "Cylinder Bushings," the report being read by Mr. Barr, who stated that the conclusion of the committee was that the employment of satisfactory cylinder bushings was a simple matter which was thought to be sure to become gen-

eral practice. Mr. Henderson had had such good results with the application of bushings and false valve seats, as applied to new engines, that he considered there was a valuable mechanical improvement to be obtained by their use. Mr. Miller thought the application of these attachments unnecessary if the proper material and packing was used. Mr. Vaulain agreed with Mr. Miller and advocated putting in bushings and false seats only after they became necessary on account of wear. Mr. Gentry related that he had obtained an advantage of the difference between 20,000 miles and 100,000 miles between borings, by the use of bushings which were made of good wearing iron. Bushings were found specially valuable in application to soft cylinders. He did not advocate applying them to new engines. Mr. Brown had used bushings in inside connected engines abroad. He was not in favor of bushing new cylinders. Mr. Quayle gave the chief reasons for bushing new cylinders. He had some engines in use which had been running thirty years and were not yet bushed; on the other hand some which had been used only five years were bushed on account of wear. To secure uniformity a steeled iron bushing for new engines was decided upon. He believed that the use of steel cylinders would soon become general on account of lightness. The application of false valve seats of steeled iron was made for the same reason as for the bushing of the cylinder.

Mr. Mackenzie thought it unnecessary to bush cylinders or to apply false seats. He had obtained 300,000 miles of service from valves without refacing the valves. The proper course was to use the right quality of material and good packing.

Mr. Barr spoke of the difficulty in getting good iron which will wear properly and not crack. He likened the making of cylinders in a single piece to the making of wheels in a single piece. The tire was required to resist the wear of the rail while the rest of the wheel should be strong. His trouble had been to get iron tough enough to prevent cracking. The friction between the piston and the cylinder was estimated to be often as high as 20 per cent of the total power of the engine. The bushing could be made hard for wearing and the cylinders could have strength absolutely without reference to wearing qualities. The gain in economy in fuel was thought to repay the cost of applying bushings several times over.

Mr. Leeds agreed with Mr. Vaulain and further considered that the necessity for bushing would be removed if the spiders of the pistons were always kept out of contact with the cylinders. Mr. Herr reported satisfactory results with bushings. He had found it difficult to obtain proper material for making cylinders of large size so as to wear well and not break. His experience covered the application to 50 engines. The use of hard false seats had improved the working of the valves. Mr. McConnell believed that it did not pay to bush old cylinders or to put in false seats, but advocates scrapping those which were worn enough to bush.

The report upon "Hub Liners" was presented by Mr. R. H. Soule. Mr. Atkinson opened the discussion, giving an account of satisfactory service with babbitt hub liners which had not been treated by the committee. Mr. McConnell reported excellent results with babbitting driving boxes which had in one case given a service of 40,000 miles with only  $\frac{1}{16}$  in. of wear of the babbitt. Mr. Gibbs reported good results with babbitting driving box faces. Mr. Herr had used babbitted boxes and used liners on cast steel wheels only. Mr. Wm. Forsyth read a letter from Mr. Joel West stating that he did not consider it necessary to apply liners to new wheels, which was in opposition to the opinion of the committee. Mr. Vaulain advocated uniformity in the application of hub liners as recommended by the committee. Babbitt would give less wear than other metals. Mr. McIntosh recommended a liberal amount of lost motion between the driving boxes for the purpose of decreasing wear. Mr. Thomas deprecated the counterboring of driving wheel hubs because of shortening the wheel fits and advocated taking up the lost motion by the application of babbitt upon the box faces.

The report on "Steam Pipe Joints" was next taken up after reading by Mr. Gibbs. Mr. McConnell opened the discussion with a description of malleable iron steam pipes which he had used with good results. The malleable pipes were only  $\frac{7}{16}$  in. thick and the material admitted of the bending of the pipes to relieve the stresses due to expansion and contraction. Mr. Herr had replaced brass joints with cast iron with satisfactory results. He thought the question of bolting as important as that of the material of the joint and four bolts were thought necessary to produce a satisfactory joint.



The rest of the session was devoted to a discussion of the relative merits of radial and crown bar staying of boilers which had been brought up in connection of a report of the railroad commissioners of the state of New York. The commissioners were represented by Mr. Rickard who desired an expression of opinion from the association. The discussion was animated and general, many cases of boiler explosions being described, and the direction taken by the discussion is shown by the resolution offered by Mr. Wm. Forsyth, and passed, to the effect that it was the sense of the meeting that radial stay boiler were as safe as those having crown bars and that they were easier to keep clean and in repair. The session then adjourned to visit the Schenectady Locomotive Works at Schenectady for which a special train was provided by the Delaware & Hudson Canal Co.

The last session of the convention was opened Wednesday morning and the first business taken up was the adoption of the report of the committee on resolutions, submitting resolutions of thanks to all who had assisted in making the convention successful. Mr. Forsyth, chairman of a special committee to consider changing the constitution with reference to the candidates for the association scholarships, reported a proposed change in article 7 to provide for selecting candidates first from the sons of master mechanics, employees or sons of employees are afterward eligible. Also the requirement of one year's experience in the shops was abandoned.

It was also proposed that a third vice president be added to the list of officers. The by-laws were changed as follows: The date of the annual convention was made the third Tuesday in June and the roll call was abandoned for a card registration. The first report of the day was that of the committee upon the "Apprentice Boy." Mr. Bradley, chairman of the committee believed that there was a great awakening of interest among the members as to how best to train and educate men and obtain loyalty from them. This was equally important with improvements of mechanical construction. Mr. Briggs spoke of the outside influences exerted over apprentice boys which seriously interfered with satisfactorily educating them.

President Smart of Purdue University stated that that college desired information as to the necessities with regard to the apprentice boy question and that it stood ready to cooperate with the association. A mechanics institute with a series of lectures similar to the "Lowell Institute" of Boston for the benefit of those who are working in machine shops, had been carefully considered and advice was asked as to the methods to be followed. Mr. Forsyth criticised the report because the committee stated that it would be useless to recommend a system of apprenticeship. He thought that a system should be arranged and moved that the committee be continued to present a report upon an apprentice system which should cover all of the departments in which apprentices may be educated. The motion was carried. Mr. Sinclair spoke favorably of night schools and for correspondence schools from which good results had been obtained. Mr. Miller stated that he had about one apprentice for every five machinists. They were carefully selected as to morals and ability. He found that the best boys were those who received instruction which they paid for themselves, either from a draftsman or from a correspondence school. The boys should be advanced as fast as possible and they should be encouraged. Much was to be accomplished by fair treatment. Mr. Herr thought that the shop training was the most important part of an apprentice system. He believed that there was a lack of systematic training in the practical work, and much depended upon who was selected to instruct boys in this direction. Mr. MacKenzie advocated the use of an examining board for apprentices similar to those having charge of trainmen. Careful selection and encouragement were considered essential, and no pains were taken to take boys from the families of employees. Mr. Barr spoke of the features of education recommended in the report and approved of the principle of training boys in the practical subjects which will be useful in shop work to the exclusion of subjects which had no practical application. Those who could make use of subjects beyond this limitation, however, should be permitted to study them. Mr. Quayle deprecated the practice of "drill press and bolt cutter apprenticeship" which made apprentices expensive to employers. Proper education of boys resulted in economy in the shop. He had two classes of apprentices, one without and the other with previous technical education, which practice was believed to be the best system, the boys being given opportunities to advance according to their qualifications and earnestness.

The reports of the auditing committee and the

committee on subjects were then received, after which the secretary presented the report on "Driving Box Wedges." Mr. Mackenzie advocated the use of stationary wedges and had found the bearing surfaces too small as ordinarily used, and advocated the increase to about 5 in. in width, which would render the necessity of adjustment less frequent. Mr. McIntosh had found trouble in obtaining proper adjustment with liners and advocated the use of liners  $\frac{1}{4}$  in. in thickness and others could be substituted which varied from that size by one hundredth of an inch in thickness, and by means of these small adjustments could be conveniently made.

The next report was on "Steps and Handholds," and was followed by that upon "Truck Swing Hangers," which was read by Mr. Mackenzie. The committee was continued with the understanding that it should arrange to have several roads take up the question experimentally, for report next year. The report of the committee on "Locomotive Grates" was not received and was carried over until next year without discussion. Attention was then given to the report on "Thickness of Engine Truck Wheel Flanges," presented by Mr. Leeds. It was criticized by Mr. Bradley on account of the fact that the recommendation referred to what the economical thickness should be rather than stating the minimum thickness which may be used with safety. Mr. Hatswell, who asked the question last year which led to the appointment of this committee, did not consider that his question had been answered. It was voted that the limit of thickness of wheel flanges on engine trucks be placed at one inch and that the Master Car Builders' gage should be used in determining it. The last report of the convention, "To adjust dimensions on standard sizes of tubes to agree with recommendations of standard of gages for sheet metal, tubes, etc.," was read by the secretary and a resolution was passed modifying the standard in the manner recommended by the committee.

A resolution was offered by Mr. W. H. Lewis to change the present practice of reporting locomotive performance from the train or car mile basis to ton mile units, which was passed. The election of officers resulted as follows: President, R. H. Soule; first vice president, Pulaski Leeds; second vice president, Robert Quayle; treasurer, O. Stewart. Mr. Swanston proposed the names of Messrs. Alexander Galloway, of the C. H. & D. Ry., and John McKenna for honorary membership.

Colorado Springs, Old Point Comfort, Bar Harbor, Niagara Falls, Chicago and Denver were nominated as the place for holding the next convention. A test vote resulted in the following: Colorado Springs, 40 votes; Old Point Comfort, 7 votes, and 5 votes each for Bar Harbor and Niagara Falls. The convention then adjourned.

#### RIEHLÉ FOUNDRY TESTING MACHINE.

The manufacture of testing machines for use in foundries has been established for some time with the Riehle Bros. Testing Machine Co. of Philadelphia, and to meet the demand for apparatus of increased capacity the design shown in the accompanying illustration has been brought out by them. It has a capacity of 7,500 lbs., and is adapted to take specimens of a length of 48 in., and the tools are ar-



FOUNDRY TESTING MACHINE

ranged to take specimens 1x2 in. tested flat. The first of this type was made for the Griffin Car Wheel Works of Buffalo, and since that one was put into service several have been shipped abroad. The machine is compact and is well arranged with reference to convenience of operation.

#### THE MASTER CAR BUILDERS' CONVENTION.

[Continued from last week.]

The session of Thursday morning, June 18, opened with the reading of a communication from Mr. R. H. Wilbur, of the Lehigh Valley Railroad, which was accompanied by letters from Mr. C. A. Park, of the London & Northwestern Railway, giving explanations of the methods in use in England with reference to the interchange of cars. The inspection there is for safety only and cars are stopped by inspectors only for making such repairs as are necessary to provide safety in transit. Reference was also made to the workings of the clearing house system, which made it possible to avoid the necessity of such a code as is used in this country. After the presentation of these letters the report of the committee on location of air-brake cylinders on freight cars was read and discussed. This report was published in abstract in THE RAILWAY REVIEW of last week. The discussion chiefly concerned the marking of the hose giving the figures for recording the guarantee and the service of hose and the change in the location of the brake cylinder and triple valve from the center of the car to the neighborhood of the side sill, this being recommended with a view of ease of repairs and cleaning, as well as to render such work safer to the men who now are obliged to go under the cars. Radical changes in the present practice were involved and Mr. Schroyer objected to the change which would necessitate extensive alteration in the lengths of rods and levers. Mr. McCarty defended the proposed change on the ground of the possible improvement offered over the old standard, and stated that it was possible to secure new standard levers and rods, and that good results had been reported on roads which had tried these locations. Mr. Rhodes considered that the arguments of the committee for the change in location were strong and indorsed the recommendations. The discussion was dropped at this point to take up the subject of revision of interchange of freight cars, which was introduced by Mr. F. D. Adams, who after a few remarks upon the early attempts at interchange of freight cars presented Mr. John Mulligan, president of the Connecticut River Railroad Co., who supplemented the remarks upon the same subject by relating from his early experience. The report of the arbitration committee was then read by Mr. G. W. Rhodes.

The discussion on the report of the arbitration committee was read by numbers of the rules and each considered as satisfactory unless amended in passing. The report was substantially that of the committee of twenty-one, an outline of which was presented in THE RAILWAY REVIEW of January 18, 1896. There were no changes whatever up to the rules in regard to billing, and to the save the time of the association the rules concerning prices were submitted to a committee for report to the convention at a later session. A rule was added as follows:

"Switching roads will not be allowed to render bills for broken parts, and will be held responsible for all new defects which occur while cars are in their possession." The only other change from the reported rules consisted in the correction of a mistake which the committee had made. Authority was given to the arbitration committee to establish rulings upon questions which might arise which should stand for the year until the next convention should give an opportunity for the association to take action thereon. The revision therefore consisted in the acceptance of the report of the committee of twenty-one with two changes suggested by the arbitration committee and the whole



code is based squarely upon the Chicago interchange.

The noonday discussion was opened by Mr. S. Higgins upon the subject of the proposed adoption of the metric system through legislation. Communications were read from Wm. Sellers & Co. expressing the dissatisfaction of that concern in the practical application of the system in shop work. Mr. Gibbs stated an objection to the metric system, in that it was not susceptible of division into halves with the facility of the present system, and he could see no advantages to be gained by the adoption which were at all commensurate with the objectionable features of the system. By motion of Mr. Higgins a resolution was passed condemning the obligatory adoption of the metric system and the secretary was instructed to send a copy of the resolution to the metrological society which is active in efforts to secure the passage of the proposed legislation. The next subject was the question, "Should not two iron buffer blocks be used on cars when M. C. B. couplers are applied?" Mr. Bronner opened the discussion by reading the brief paper which appears elsewhere in this issue. At the close of the discussion it was voted to submit the question of whether buffer blocks should be applied in connection with the M. C. B. standard couplers as recommended practice of the association to letter ballot.

The afternoon session of Thursday opened with the report of the auditing and nominating committees, the latter presenting the following names: President, S. A. Crone; first vice president, E. D. Bronner; second vice president, C. A. Schroyer; third vice president, J. T. Chamberlain; treasurer, G. W. Demarest; members of the executive committee, G. W. Rhodes, Pulaski Leeds and M. M. Martin. These were afterward elected. The discussion of the report of the committee on location of air brake cylinders was continued in which the drain cups and screens received attention. Mr. Rhodes and also the committee suggested new forms of drain-cups which were designed with special reference to ease of removal of the screens for cleaning. Mr. Cloud was asked for a statement upon the subject of drain cups and screens with reference to the advisability of changing the location and direction of the branch pipe. He did not consider the complication by adding parts necessary to lead the branch pipe upward as being attended by sufficient advantages to warrant such practice. The new screens were found to give no trouble by clogging and had proved themselves capable of keeping clear from the action of the air. The conclusion of this discussion was followed by the reading of the report by the committee on "Axle, Journal Box, Bearing and Wedge for Cars of 80,000 Pounds Capacity," by the chairman, Mr. E. D. Nelson.

This discussion was participated in by Messrs. Rhodes, Sanderson, R. H. Soule, Nelson and Waitt. The report was highly commended and the recommendations were adopted, the necessary changes to be made in the drawings to make them conform to the other standards of the association, after which the question will be submitted to letter ballot.

The session of Friday opened with the report of the special committee which was appointed to revise the portions of the interchange rules which related to prices and comprised the remaining work of revision of the rules. About fifteen changes were suggested which consisted of bringing the prices into conformity with changes in the market prices of such parts as wheels, axles, etc. The recommendations of the committee were adopted which disposed of the whole matter of the interchange rules.

The discussion of the report of the committee on "Metal Underframing of Freight Cars" was then opened by Mr. Sanderson, who called attention to the growing scarcity of lumber of the proper quality at satisfactory prices which rendered the introduction of steel car construction timely. The advantage of the steel frame with regard to fire risks was emphasized and cases cited in which great loss resulted from the burning of wrecks caused by the ignition of the timbers of wooden frame tenders. As to wreck damages the future was not to be judged by the past. The advance of present over earlier steel underframes was great and those now proposed would be far more satisfactory than the first designs. Mr. Barr referred to the certainty of success of steel construction and of the present obstacle of high cost. He offered a motion that five individuals, not constituting a committee, should be appointed by the executive committee who should each design a steel underframe and present it with arguments at the next convention. This was carried.

Mr. G. R. Joughins gave a report of excellent experience with steel cars of his design which had been in service for three years, and after which time their condition was so good as to render it impossible to tell by inspection whether the cars had been

used one month or three years. Only one bolt had loosened in this time. He advocated the use of bolts in this construction and believed them better than rivets. The cars referred to were of 60,000 lbs. capacity and weighed 19,500 to 20,000 lbs. without the air brake. He did not consider it necessary to use patented forms or designs, nor was skilled labor necessary to satisfactory construction of steel frames. He urged the building of steel cars on the ground that after several years of service the cars would be practically new cars. There was no shrinkage and bolts were not loosened. Mr. W. R. Stirling of the Universal Construction Co. replied to Mr. Joughins remark with reference to patents and urged the roads to offer the opportunity of ascertaining the relative cost of steel and wood construction upon a commercial basis. The difference between the costs was estimated as  $\frac{3}{8}$  of a cent per pound of carrying capacity for the wooden construction against  $\frac{3}{8}$  of a cent per pound for the steel and this was thought to be abundantly made up to the railroads from the fact that the loads now carried upon thirty-three cars would be carried on thirty of the new construction.

The report of the committee on "Laboratory Tests of Brake Shoes" was read by the chairman, Mr. S. P. Bush, and was discussed briefly, principally in explanation of the diagrams. By motion of Mr. Sanderson this committee was made a standing committee to test new shoes as they may be brought out.

The report of the committee on "Passenger Car Ends and Platforms" was read by Mr. E. W. Grieves, the discussion of which centered upon the patents which were concerned in the design submitted by the committee. This was followed by the report of the committee on freight car doors and attachments, read by Mr. F. H. Soule and the subject was referred to the committee on subjects for a further report with a view of deciding upon designs of end and side doors for presentation as recommended practice of the association. The next subject was "Hand Holds and Height of Drawbars," upon which discussion was deferred until the afternoon session.

The closing session on Friday afternoon began with the consideration of the report on "Hand Holds and Height of Draw-Bars." It was voted to eliminate from recommended practice the mention and drawings of grab irons the presence of which was necessitated by the link and pin coupler because they were not needed with M. C. B. couplers. The reports of the committees on, "Uncoupling Arrangements for M. C. B. Automatic Couplers," and that on "The Stenciling of Cars" were the last regular reports to be received. The former was given in full in our issue of last week, while the latter appears in the present issue. They were briefly discussed. Mr. Waitt suggested that 14 out of the 16 couplers shown might be satisfactorily operated by practically the same form and arrangement of uncoupling devices. He also moved that the committee be continued to report upon an uncoupling device which should be designed with reference to applicability to use in connection with as many of the different couplers as possible. Mr. Rhodes offered the following resolution:

Resolved, That it is the sense of this meeting that in settling with insurance companies for destroyed freight cars that salvage allowance shall be made upon prices for

scrap material allowed by the rules and that the values of cars shall also be taken from the rules.

This was adopted.

The following list of subjects was reported by the committee on subjects for the 1897 convention and accepted:

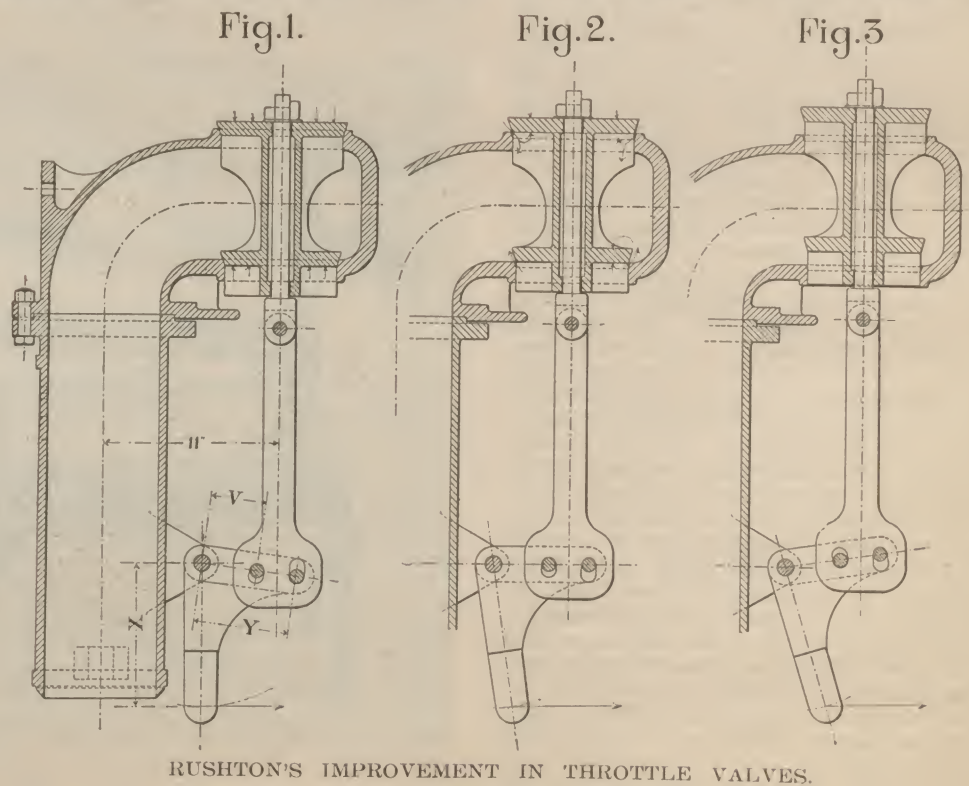
1. Further consideration and suggestion of rules for loading logs, poles, bark, long iron, bridge material, etc.
2. Break-in-twos; causes and effect and to suggest a remedy.
3. Present a design for a passenger car pedestal and oil box, for  $4\frac{1}{4} \times 8$  in. journal.
4. Revise specifications and guarantee for cast-iron wheels, including a consideration of the form of wheel.
5. In conjunction with a committee from the Master Mechanics' Association to revise the code of rules pertaining to air brakes and signal instructions.
6. To follow up and report on improved buffers for freight cars.
7. To submit designs of side and end doors for box cars, including fixtures for adoption.
8. To recommend section of archbar and archbar bolts for cars of 60,000 pounds capacity, and submit design for archbars and archbar bolts for cars of 80,000 lbs. capacity.
9. Consider the subject of trucks, springs, and what can be done in the way of standardizing them for cars of various capacity.
10. To advise what changes may be necessary in the standard size of M. C. B. automatic coupler shank, and recommend standard yoke or pocket strap for rear end attachments.

The committee on subjects also offered a resolution to the effect that the Master Car Painters' Association be requested to investigate the subject of protective paints for metal framing of car bodies and trucks, which was adopted. The special committee on loading poles and structural material presented a report which was ordered submitted to letter ballot without reading. On a motion by Mr. Mitchell it was voted to return to the plan of beginning the annual conventions on Tuesdays.

The report of the committee on correspondence and resolutions included the usual resolutions thanking those who had contributed to the success of the convention. Chicago, Old Point Comfort, Denver, Niagara Falls, Montreal and Colorado Springs were nominated for selection of the location of the next convention. This was followed by the election of officers as nominated and the usual installation speeches were offered after which the convention adjourned.

#### RUSHTON'S THROTTLE OPENING ARRANGEMENT.

A drawing has been received from Mr. Kenneth Rushton of the Baldwin Locomotive Works showing an arrangement of a throttle valve opening mechanism, which was designed for the purpose of overcoming the large amount of resistance which is met with in opening locomotive throttle valves of large size. This device has been used by the Baldwin Locomotive Works with very satisfactory results, and it has the important advantages of simplicity and adaptation to the ordinary form of throttle valve without expensive attachments being necessary. The leverage is so arranged that when the valve is opened under pressure the power exerted will be greater in starting the valve than in continuing the movement. The balancing of the pressures upon the top and



RUSHTON'S IMPROVEMENT IN THROTTLE VALVES.



bottom disc is not perfect on account of the larger area of the top disc. This makes it more difficult to perform the first part of the motion of opening than it is to complete the movement after the pipe has become filled with steam and the joint is completely broken. It will be noted that a bell crank is used as usual and that the lower end of the valve stem is in the form of a jaw, and is provided with two slotted holes which receive pins secured in the bell crank. These are so disposed that in the left-hand figure, with the valve closed, the inside pin is in contact with the top of its slot and is, therefore, ready to lift the valve when any movement of the bell crank takes place. The outer pin rests against the bottom of its slot in this position which holds the valve closed until the movement of the crank begins.

The first movement of the lever raises the valve in the position of the central figure and when the upper arm of the bell crank becomes horizontal, both pins are in the upper sides of their slots from which position the outer pin continues the lifting into the fully opened position, as shown in the right-hand view, the leverages being changed in the meantime from that shown at V to that at Y of the left-hand view. The rapidity of the movement of the valve is correspondingly changed with the bearing of the pins and this is advantageous in that a slow movement of the valve when first opened is desirable and the subsequent rapid movement is equally so. Several other arrangements for producing this result have been devised by Mr. Rushton, but the one illustrated is the most satisfactory and is the one used by the Baldwin Works.

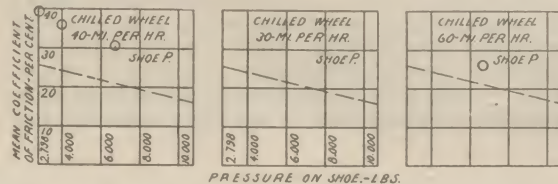
#### A NEW WHEEL MOUNTING GAGE.

In the report of the committee of the Master Car Builders' Association upon "Mounting Wheels," presented last week at the Saratoga convention, a novel and convenient gage was shown for use in mounting wheels symmetrically upon axles. This is a light and well constructed tool of which the accompanying illustration shows the form and details of construction. The body of the gage is composed of a piece of  $\frac{1}{2}$  in. wrought iron pipe upon the ends of which the half fork shaped stops of malleable iron are mounted. These are permanently fixed to the pipe by clamping, one side of the casting being sawed through for the purpose. At one end of the gage, the left hand end in the drawing, a movable plunger is fitted which is constantly urged outwardly by a coiled spring. This plunger carries a reference point which is brought close up to a graduated scale along

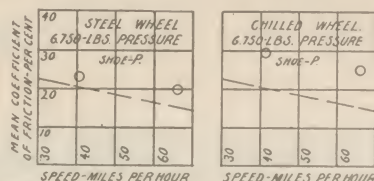
a suitable modification can readily be made. In the case of second-hand wheels, however, it was the opinion of the committee that best practical results would be obtained by mounting them from the inside of the flange. They also state in the report that in their opinion this also applies to new wheels. The gage is light, strong and convenient in that it admits of watching the movement of the wheel and of stopping at the right point. A sample was shown at the convention by Mr. A. M. Waitt.

#### THE KINZER BRAKE SHOE.

One of the exhibits which attracted much attention at the Master Car Builders' and Master Mechanics' conventions, recently held at Saratoga, was made by the Kinzer & Jones Co., of Pittsburgh, and consisted of a composite brake shoe. One reason for this attention was the fact that this was the only shoe exhibited, but the main reason was owing to its



being an entirely new departure in the brake shoe line. The accompanying illustration shows a section of the shoe, and from this it will be seen that it consists of a shell filled with a composition. The shell is of cast iron and the ingredients of the composition, a large percentage of which is cast iron, are packed into this shell under heavy pressure and then baked



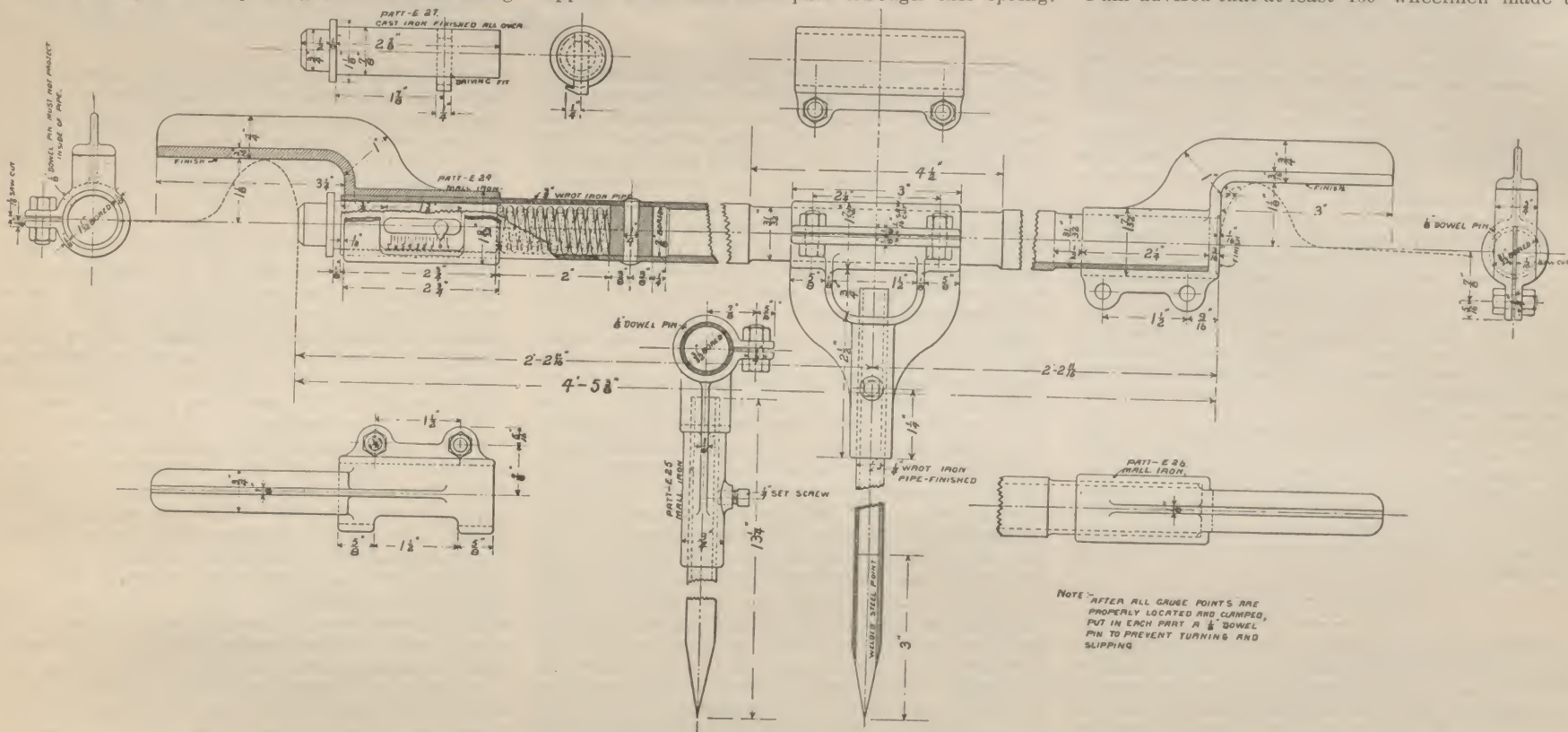
at a high temperature. In mixing the ingredients care is taken to use materials which will give the greatest percentage of friction without wearing the wheel to an unreasonable extent. One of the most important features of the design is a flat steel spring located between the shoe and head and all pressure applied to the shoe must pass through this spring.



on brake shoes. This was done and the result is shown in the accompanying diagrams, in which a comparison of the co-efficient of friction with that given by a cast iron shoe is plainly shown. In this diagram the dotted lines represent the result given by the cast iron shoe, and the small circles that given by the Kinzer shoe under exactly similar conditions. From this it will be seen that the latter makes a much better showing, giving a co-efficient of friction of 40 per cent under conditions in which the cast iron gives less than 25 per cent. It appears from this that this shoe and connections are worthy of more than passing note and should receive a careful consideration from the railroads. The company will furnish shoes for tests on application.

#### Through Yellowstone Park on Wheel.

Chas. S. Fee, general passenger agent of the Northern Pacific has issued a circular in which he says: "Owing to uncompleted condition of the roads in the Yellowstone National Park we have heretofore refrained from urging upon bicyclists the attractions of this trip. I am now glad to advise you that, notwithstanding the fact that Yellowstone Park is in heart of the Rocky Mountains, it has over 150 miles of well-built government roads, on the major part of which will be found excellent wheeling for bicyclists. I am advised that at least 100 wheelmen made the



#### A NEW WHEEL MOUNTING GAGE FOR NEW AND OLD WHEELS.

which it travels through a slot. The zero mark of this scale gives the correct position of the plunger for pressing wheels to a distance of 4 ft. 5 $\frac{1}{2}$  in. between the inside surfaces of the flanges and in the pressing on of wheels this indicates the time to stop the movement. The gage is fitted with a reference point at the center for the purpose of mounting the wheels symmetrically on the axle.

In the report the committee states that this gage has been in practical use for over a year and that it gives very satisfactory results. For those wishing to mount new wheels from the outside of the flange,

The advantage claimed for this spring is that it will allow the shoe to adjust itself to any uneven places in the wheel or irregularities in the pressure caused by an uneven track. In fact, it insures an even pressure on the wheel at all times and under all conditions.

Numbers of these shoes have been in regular service for some time past, and in heavy and continuous service it is claimed that they have a longer life than the best cast iron shoe; that the wheels on which they were used showed no ill effects from heating, the composition being a non-conductor of

entire tour of the park from June 1 to September 30, 1895."

This information is furnished because of inquiries concerning the practicability of making the trip through the park on wheels. The editor of the RAILWAY REVIEW is included in the one hundred wheelmen above referred to. In company with two friends he made the trip in September last and can certify that with the exception of a few hills, which are easier to walk up and safer to walk down, the entire distance affords good wheeling. The hotels and lunch stations which are first class in every respect are of easy dis-



ances apart, while the scenery and surroundings cannot probably be equaled in the world. There is no more enjoyable trip on wheels anywhere than a ride through Yellowstone park. So impressed is the writer with the advantages of this method of seeing "Wonderland" that he will willingly give information as to equipment necessary to anyone contemplating the trip.

#### M. C. B. COUPLERS AND BUFFER BLOCKS.

The noonday discussion at the Master Car Builders' Convention of last week, which was devoted to the question as to whether two iron buffer blocks should be used on cars when M. C. B. couplers are applied was opened by Mr. E. D. Bronner, as follows:

In connection with this subject let us consider the nature of the demands made upon our draft gear without the buffer blocks as ordinarily constructed. We all know that the force of the blow delivered by a loaded freight car moving at the ordinary speed used in switching is much more than can be overcome by resistance of the eighteen or nineteen thousand pounds capacity springs commonly used. Draft gear probably gets the most severe usage in this part of the service, but the running up of the slack in the unbraked portion of trains when the air brakes are applied on the front end and the shocks received in going through sags in the line are also of a nature to put a severe strain on the draft gear. These blows being sufficient to exhaust the spring the shock must be transferred through the followers, stop blocks, draft timbers, balls, etc., to the longitudinal frame work of the car where it is absorbed. The ordinary underhung draft gear, on account of the leverage exerted, is certainly not the best method to transmit these heavy buffing blows to the portions of the structure where they must finally be absorbed.

The consequence of this condition of affairs is, as every one dealing with car repairs knows, that expenditure and delay due to damaged draft gear are extraordinarily large. In fact it is far the largest item of expense in running repairs—outside of wheels.

It is contended by the advocates of the double iron buffer blocks that by their use much of this damage could be prevented. It seems reasonable to presume that as the blow must finally be absorbed by the frame work it would be better to transfer it there in the most direct manner by means of the iron blocks placed in the line of the greatest resistance. By a proper adjustment of the faces of the knuckle and buffer blocks the blow can be delivered in the direct line of the longitudinal timbers just before the spring becomes exhausted.

This being granted, it becomes necessary to consider whether there are any disadvantages connected with their use. Do they in any way interfere with any of the functions of the coupler?

The large number of cars so equipped at the present time would seem to be a sufficient answer to this. My own experience is that with proper adjustment they will permit coupling on any curve where the coupler itself will lock without them.

The "man killing" view of the double iron buffing blocks has always been overdrawn and the use of the M. C. B. coupler will soon render it sorely necessary for employees to interpose their bodies between cars when coupling.

The extra expense of applying the iron buffer blocks is not over \$5 per car, and if they would save a portion of the repairs due to damaged draft gear, they would certainly save their cost very quickly.

The horn of the M. C. B. coupler was probably designed to transfer the heavy buffing blows from the draft gear to the framework, but a trip through any railroad yard noting the battered condition of the point where this blow is received, will convince any one that this is a failure. If the construction can be made such that this does not occur, it still subjects the coupler bodies to strains that bring about many failures. In looking over the records for several months I found that at least 30 per cent of the failures of coupler bodies are from cracks and breakages in the neck and shank.

At present we have no standard iron blocks for use with M. C. B. couplers. There are thousands of cars equipped with the blocks and we should certainly adopt one. It would bring about uniformity in design and would probably encourage the adoption of them by those who appreciate the benefits to be derived from them, which benefits will increase as the number of cars equipped with the blocks increases.

#### Summer Outings.

Summer outing literature is fast assuming a prominent position in the publications of railroad companies, and the artistic beauty manifested in some of these booklets testify to a painstaking discrimination on the part of their authors. Among the more recent issues of this character are some very pretty specimens put forth by the advertising department of the Michigan Central Railroad, one of the most tasty and useful being "A Summer Note-Book." As might be expected, Niagara Falls and its surroundings occupy a chief place in this booklet, but many other resorts reached by this road on its own lines and those of its connections are graphically described and beautifully illustrated. A useful feature is the names of the principal hotels located at the various resorts and the number of people they will accommodate, thereby supplying information which ordinarily requires time and special effort to obtain.

In addition to the "Summer Note Book," this road issues a special Niagara Falls booklet filled with descriptive literature and gems of pen and pencil from the best authors and artists. Another pretty publication of the same company is "Notes for Teachers," in which the various objects of interest for teachers on the way to the National Educational Association which holds its annual convention in Buffalo, are set forth. Aside from the valuable features in the way of information, these booklets are all worthy of being preserved because of their artistic merit.

#### ILLINOIS CENTRAL LAKE FRONT IMPROVEMENTS.

The general plan of the extensive improvements which are being made by the Illinois Central Railroad in connection with the Lake Front Park in Chicago were outlined and illustrated in a general way in the RAILWAY REVIEW of November 23, 1895, in which a plan was given showing the right of way of the road and portions of land acquired by the road, and which are now being filled in preparatory to the work of the rearrangement of the yard tracks. It was stated at that time that the entire right of way was to be depressed about four feet between Ran-

Details of the wall were referred to in the previous article. It is 17 ft. in high with a concrete foundation 4 ft. deep. The wall is of rubble masonry and is 8 ft. in width at the base and 2 ft. wide at the top, the foundation being 9 ft. 6 in. wide. The wall is 6,000 ft. long and projects 1 ft. above the filling for the park. The two tracks upon the west side are being ballasted with rock which likewise applies to the two express tracks which are used for the suburban express service. This ballast will be 10 inches in thickness. The freight tracks are ballasted with 10 in. of slag covered with cinders. The system of drainage has been worked out with special care. The main lines are of 28 in. tile and graded down to 8 in. tile at the outlying ends. It is divided into three systems, one emptying into the old Slip C, shown in our issue of November 23, 1895, and one through the new park directly east into the lake while the third will lead southward and empty into the yacht harbor. There will be a catch basin for every 200 sq. ft. of area of the right of way, the top of which will be below the subgrade so as to permit of draining the ballast completely. After the excavation and the ballasting is completed the tracks will be allowed to settle for 10 days, which is a sufficient time under the heavy traffic and then they will be raised to grade again and surfaced. The grade stakes are all



dolph street and Park Row and that retaining walls were to be built upon both sides throughout this distance over which certain of the streets were to be extended through the park by means of viaducts. The track depression is now in progress and nearly completed as well as the west wall and the new arrangement necessitated an entirely new disposition of the tracks which, through the courtesy of Mr. J. F. Wallace, chief engineer, and Mr. H. U. Wallace, resident engineer, who is in direct charge of the work, we are enabled to illustrate and describe by the accompanying engraving.

The work of the depression of tracks was begun April 8 of this year, and from the present indications it is thought that the construction will be completed and the new track surfaced by July 1. This work includes the removal of about 95,000 cubic yards of material, the building of two miles of additional yard tracks and the completion of the west wall. At present there remains about 9,000 yards of material to be moved, and the entire rearrangement of the main and freight tracks has been completed, so that the trains are now running over this portion of the road as they will be operated upon the completion of the improvements. Except at the crossings, there are 14 tracks throughout this section, all of which had to be lowered four feet, the actual portion depressed to this depth, being 5,000 ft. in length by 200 ft. in width. The new arrangement involved also the placing of 25 double slip switches, 18 of which were furnished by the Ajax Forge Company and seven by the railroad company, all of the work being done by the employees of the road. Two work trains have been employed constantly from the beginning of the improvements up to this time and including the time during which the track changes were effected, there have been absolutely no delays to passenger trains. The number of men employed is 550, and the rate of excavation is about 2,000 cubic yards per day taken from under the tracks. This work is carried on with difficulty, owing to the presence of a large number of trestles, old piles and other wooden structures which must be removed in order to get the tracks down.

to be removed and center stakes only allowed to remain. No changes are to be made in the rail sections, those for the freight tracks being 60 lbs. and for the passenger tracks 75 lb. section of the American Society of Civil Engineers' standard. The new plan of the tracks was laid out from a base line which will be marked upon the completion of the work by stone monuments set in concrete. All of the main tracks are parallel to this line, which will greatly simplify any further changes or additions to the work. In the engravings the number of the tracks are as follows: The Illinois Central freight tracks are numbered 1 and 2. Track No. 3 is used by the Michigan Central and track No. 4 is a Michigan Central switch track. Track No. 5 is a suburban switch track and Nos. 6 and 7 are suburban tracks.

Fig. 1 of the accompanying illustrations shows the old arrangement of tracks which has been in use for about two years, and which represented the plan at the time of the commencement of the improvements. The changes which have been made are shown in Fig. 2, which gives the plan as at present in use. The change of the arrangements constituted one of the most interesting parts of the work up to this time, and from the fact that the traffic is very heavy here and that not a single train was delayed shows that it was planned well and executed skilfully. This work was personally superintended by Mr. H. U. Wallace. A glance at the drawings will show that the limits of the change were between the south line of Peck Court and the north line of Adams street. The material under these tracks had been removed as far as possible up to the switches and crossings and everything was made ready for the change on Saturday morning May 16, when the tracks opposite Harrison street on the west side of the right of way were taken out bodily and the material piled up in the nearest available open space. Four feet of the earth was then removed and the new tracks located and connected up when ready. Two hundred and seventy-five men were employed on the change until its completion at 9 p. m., on Sunday the 17th. From Saturday morning at 7 o'clock until 2 p. m. the same day 550 men were employed and the size of the gang



after that time was 275 men relieving each other at regular intervals.

The change required the removal of old trestles, piles and timbers which were under the old tracks and upon which they had at some time been supported and in addition to this 2,500 yards of earth was disposed of upon work trains which hauled it away. The train movements at this point are very heavy. There are 329 regular scheduled trains passing the crossing at Harrison street daily under rather lower than ordinary conditions of traffic, the counting being done upon a day when the movements were not ordinarily heavy. The extra train movements were sufficient to bring the total number of engine movements for twenty-four hours up to 701 and during time 2,851 cars passed Harrison street. The passenger movements are heavy in the day time and at night this business gives place to freight movement. From the previous description as well as the foregoing it will be seen that these late improvements embody some specially interesting work involving a number of branches of engineering, namely, the building of a sea wall, dredging, filling of the harbor, the entire rearrangement of the tracks, the construction of about 12,000 ft. of rubble retaining wall 17 ft. in height and the construction of viaducts to which must be added the drainage of the whole plant.

The private compartment cars for family parties desirous of securing more privacy than is obtainable in the ordinary style of sleeping car: as well as with ladies traveling without escort, contain ten private staterooms, each is provided with a double upper and lower berth and equipped with every toilet convenience. The compartments are connected by sliding doors, and can be arranged *en suite* for the accommodation of families traveling together, or can be used separately, as desired.

For elegance of appointment and excellence of menu, "The Northwestern" dining cars have achieved a national reputation, and the cars which are run upon the Northwestern Limited having been built expressly for the service, embody every modern idea conducive to the highest class of service. In the interior arrangement special attention has been given to affording ample room for the convenience of guests.

The buffet smoking and library cars are handsomely furnished with easy chairs, writing desks, book cases, containing a choice selection of popular and standard works, and the latest weekly illustrated and principal daily papers. While these cars are designed especially for the convenience of smokers, the library is accessible to all, and any of the books mentioned in the catalog are at the disposal of pas-

down from the whole size, and can be raised, in rapid drawing, by taking off diameter sizes from one drawing and using them as radius dimensions in the other, a process impossible between 1-2 and 1-5 sizes. The true value of this extended series of scales, with its peculiar advantages, is manifest to any one familiar with both, and admits of no dispute. It is a wonder that draftsmen brought up under a metric rule take so kindly as they do to our unphilosophical system. The value of the drawing room system is tested or tried when the drawings reach the machine shop. It is there that errors are found out. An incorrectly figured drawing costs nothing, so long as the drawing rests quietly in the drawer; but it costs fearfully when the error is discovered in the partially finished machine. All engineers agree on one thing, viz., the fewest possible figures that can be used to express dimensions clearly, the easier it is to work the drawing, and the less liability to make mistakes. Beautiful as is a decimal system in calculation, and we all use it, save in mental arithmetic, it has been found advisable to avoid the use of decimals as far as possible in the drawings used in our workshops, even in metric using countries. A misplaced point is an easy error to make, and may cause no end of trouble and expense. An essential of all machine shops is a drill system, a series advancing by 1-16 to 1 inch, and by 1-8 inch up to 2 inches is equivalent to advancing by 1 1-2 mm. in a metric series. Such an advance as 1 1-2 mm. is impracticable, because it must be memorized entire; it affords no holding place for the memory. As an engineer I can see no possible good to come to American machinists from the change. Its introduction exclusively would not diminish his labor in any way; it would not cheapen his product, it would increase its cost." The fact that William Sellers & Co., have used the metric system for 30 years, and now condemn it, is good evidence, I think, that the mechanical people of this country do not want to use the metric system in our shop work.

#### CONVENTION NOTES.

At the meeting of the executive committee held immediately after the adjournment of the convention of Master Mechanics at Saratoga, Mr. John W. Cloud was elected secretary of the association. This appointment is one which will give perfect satisfaction to all those who are interested in the association, as Mr. Cloud has for some years past thoroughly demonstrated his perfect qualifications for the trying position of secretary of such an association by the admirable manner in which he has held his position for the Master Car Builders' Association. The plan of having one man hold this office for both associations is an excellent one as it will simplify the work for the executive committee of both.

The railway supply men handsomely acknowledged their obligations to James H. Sewall, whose work for all was mentioned in our issue of June 20, by presenting him with a handsome watch and chain and charm, which was well deserved by the recipient, who made a fitting response at the presentation. The watch bore on the outside the monogram "J. H. S." and on the inside back lid "Presented to James H. Sewall by the railroad supply men at Saratoga, N. Y., June, 1896, as a token of their appreciation of his services in their interest."

Mr. C. N. Fuller, an ex-officer in the U. S. navy, who had been much in Cuba, gave in the ballroom an illustrated lecture on that unhappy island. It was well illustrated by a stereopticon, and gave to all a clear idea of that place and what is going on there. Lieut. Fuller gave an interesting talk and created much sympathy for the insurgents. Pictures of Maceo and Gomez and other leaders were applauded, and the likeness of "Butcher" Weyler, the captain-general shown, indicated that no form of cruelty was impossible to one having such a face.

A fine dress ball was tendered to each association at which the youth and beauty of each convention appeared and they were much enjoyed.

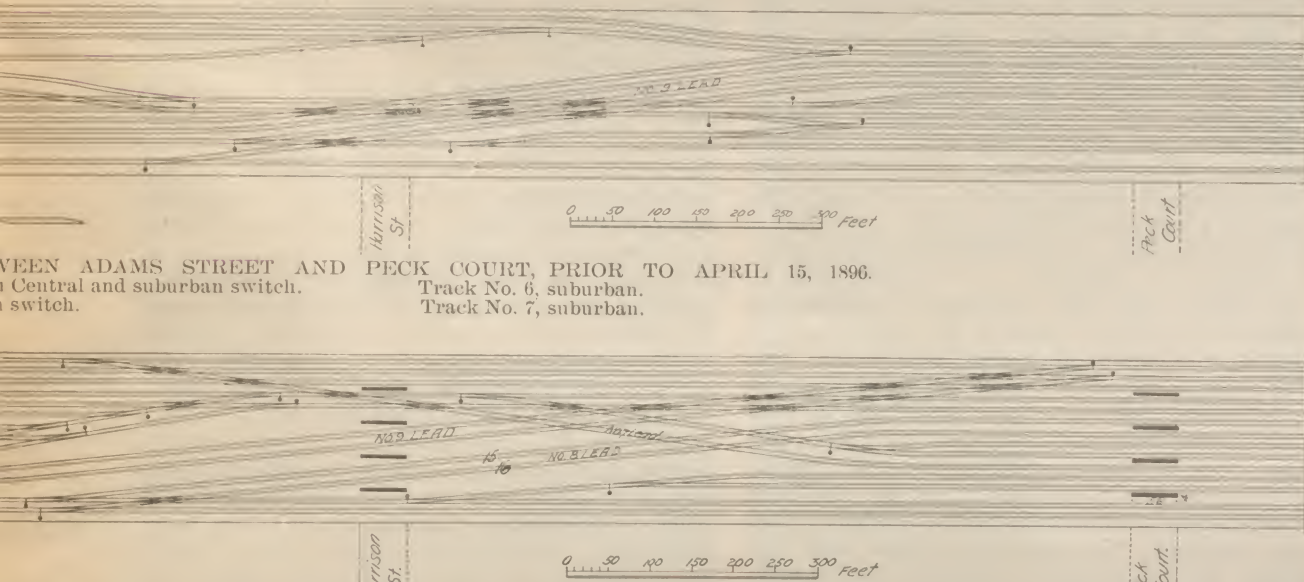
At these meetings there is an aggregation of talent of every kind. Expert sailors, expert fishermen, expert dancers and all other kinds of experts, and the newspaper contingent is in no way behind in any of these things.

The Delaware & Hudson Railroad Co. gave an excursion to Lake George, which was much enjoyed by all.

There were the usual number of souvenirs given out by various firms, which were fully appreciated by the recipients.

There were not as many ladies at these meetings as usual, to the sorrow of many of the gilded youths who shine at these gatherings.

Mr. George H. Daniels, general passenger agent of the N. Y. C. & H. R. R., has sent out advance copies of "Health and Pleasure on America's Greatest Railroad"—N. 5 of the "Four Track Series" for 1896. The contents have been thoroughly revised, and the information concerning routes and resorts will be found entirely reliable, and arranged in convenient form for reference. The book contains 532 pages, and is illustrated with several hundred beautiful new half-tone engravings and numerous maps. The leading resorts in the Catskill mountains, Saratoga, Lake George, the Thousand Islands, Adirondack mountains, Richfield Springs, Berkshire Hills, Litchfield Hills, and a host of other delightful localities, are described with considerable detail; much of interest also pertains to the chapters on California, Colorado, the Yellowstone Park, Japan and Hawaii; an extensive list of hotels and boarding houses along the New York Central and connections, and a table of comparative time, distance and rates to popular resorts, are among the valuable features.



BEFORE ADAMS STREET AND PECK COURT, PRIOR TO APRIL 15, 1896.  
Track No. 6, suburban.  
Track No. 7, suburban.

AFTER ADAMS STREET AND PECK COURT, ON AND AFTER APRIL 15, 1896.  
Tracks Nos. 11, 12, suburban switch. Track Nos. 15, 16, suburban express.  
Tracks Nos. 13, 14, suburban.

After the track work is completed all of the switches involved in the crossings at Harrison street are to be interlocked which will require a machine with about 168 working levers.

#### THE NEW "NORTHWESTERN LIMITED" SERVICE.

The superior facilities afforded by the "Northwestern Limited," of the Chicago & Northwestern, has for years made this train a prime favorite with travelers, additional popularity must be achieved on account of the magnificent new equipment that has just been put in service. From the 100 ton engine, which is representative of the most modern and perfect type of passenger locomotives, to the smoking coach, the equipment is of the highest order. In exterior appearance these trains are exceedingly handsome and imposing, being uniform in color and decoration, and solidly vestibuled from end to end with broad plate glass vestibules which completely inclose each platform. This modern feature not only contributes to the elegance of the exterior appearance, but affords occupants of the train a safe and comfortable passageway from one car to another. The cars are all new: having been built expressly for this train, and embody in their construction every modern safety appliance and every device conducive to the highest degree of comfort.

In the sleeping cars which were built by the Wagner Company, innovations have been made upon the usual set arrangement and orate decoration that has been characteristic of car architecture in the past, the result is a combination of unique effects so pleasingly harmonious and artistic as to challenge the admiration. Perfect comfort in its fullest sense has been the object sought, and while every appointment is thoroughly luxurious and elegant, perfect comfort and convenience have been made paramount, and every accessory to that end has been provided. The most noticeable innovation is the division of the body of the cars into what might be termed a series of salons or large compartments, each division containing from four to six sections.

passengers desiring to read them, and can be procured upon the application to the porters of sleeping cars. Light refreshments are served from a well equipped buffet, and the patrons of these cars experience all the comforts and conveniences incident to a well appointed club.

The ladies' coaches, especially constructed for the "Northwestern Limited," are deserving of particular mention. The seats are beautifully upholstered, provided with high backs, and afford their occupants the greatest degree of comfort. The aisles are tastefully carpeted, and in every respect these cars are fully up to the standard of the remainder of the train. Pintsch gas is used for illuminating the entire train. This system of lighting by means of compressed gas is the perfection of railway car illumination, as it is not affected by atmospheric changes or the motion of the train, burns steadily, and although extremely brilliant, is soft and agreeable. It emits no smoke, is odorless, and withal, perfectly clean. It is so effective and evenly distributed that passengers in any part of the car can read with ease and comfort. Taken altogether, the service thus provided leaves little or nothing to be desired.

#### Practical Experience with the Metric System.

In the discussion of the topic in regard to the adoption of the metric system for general shop use at the Master Car Builders' Association Convention last week, Mr. S. Higgins presented the following:

I have in my hand a pamphlet by Coleman Sellers, of Wm. Sellers & Co. I think all members know Coleman Sellers, and that he has been in their executive department for about twenty years. I would like to read a few extracts from this article. He writes: "The resting place for memory in the American series of shop sizes is the inch. The inch is divided by the process of repeated halving down to 1-16 in the usual grade of shop and merchant sizes, as in bar iron. This gives sixteen sizes to the inch for small sizes: 8, 4, 2 or 1 to the largest sizes. If a machinist should order from us a set of caliper gages from  $\frac{1}{8}$  up to 2, advancing by 1-16, and from 2 up to 4, advancing by  $\frac{1}{8}$ , we are at once informed of the shop system contemplated in his workshop." The scale series in most common use is that of  $\frac{1}{2}$ ,  $\frac{3}{4}$  and  $\frac{5}{8}$ ; this halves



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CHICAGO, SATURDAY, JUNE 27, 1896.

THE latest reports from eastern and western iron and steel centers indicate a weak condition in all lines. There have been fewer sales than usual. One encouraging feature is commented on, viz: that buyers for certain railroad companies have been quietly making inquiries for a large amount of material for track equipment and tracklaying. Billets are quiet and few selling. Lake ore is quiet, coke active, merchant iron weak. Manufacturers will not pile up stock during the summer months, but will adhere to the conservative course they have followed for a year past. Structural mill managers speak of an improving demand for shapes in orders ranging from one hundred to five hundred tons to fill requirements for small buildings, factories and warehouses. There is a continuous stream of small orders for steel rails, and in merchant steel a fair volume of summer business is being done at exceptionally low prices.

IT is to the credit of the judiciary in New York that conviction for crime is not always so long delayed as to make it practically useless for repression. The horror awakened by the killing of Mr. W. G. Wattson, superintendent of the West Shore road, had not passed away before the announcement of a verdict of "guilty of murder in the first degree" was rendered. The only regrettable thing accompanying the verdict was the recommendation of mercy by the jury. Upon what ground such a recommendation could have been made is hard to conceive. A more unjustifiable murder was never committed, and to mitigate punishment in such a case is to encourage crime. Too much of this sort of mistaken leniency has been manifest in the past, and it is about time that the sympathy which has been wasted upon criminals was extended towards those who, because of its wrong application, are subject to a degree of danger from which they would otherwise be exempt.

IT is currently stated that the Pittsburgh, Wheeling & Lake Erie Railroad will open one of the largest coal mines in eastern Ohio, and enter the field as a seller against other producers who are dependent upon it for transportation service. If the report is correct it affords another instance of the misuse of powers for which railroads are or should be incorporated. To permit the use of the highways of commerce which are required by law to be open for the use of the public on equal terms, as an element of competition against its own patrons is a violation of the fundamental principles of equity which should underlie all such service. However the charter of any particular railroad company may read, its proper function is not that of merchandising. To allow it to enter this field is to constitute it the arbiter of the fortunes of those who are obliged to look to it for transportation service. The fact that no misuse is made of such a power is no excuse. It should not be possessed. No patron of a railroad should be compelled to depend upon the pleasure of a public servant for success, nor should such public servant have the power to determine the welfare of its patrons. It is not strange that in the rapid development of the

railroad service of the country various illegitimate features should have been allowed to attach themselves thereto, but it is important that they be not allowed to become so thoroughly incorporated into the system as to render their removal impossible. It is probable that so far as roads already incorporated are concerned the matter has passed beyond the control of the states by whose authority they exist, but it is not impossible that because of the character of the service in which they are now chiefly engaged, they may be made amenable to congressional control. A railroad may not be denied the right to mine coal, raise wheat or manufacture iron in case its charter granted by state authority so permits, but congress may stipulate that a railroad cannot engage in competition in the way of trade with those it serves in the transportation of interstate commerce. To do so would be to violate one of the vital principles of the act to regulate commerce.

IN the conduct of the work of such conventions as those of the railway technical organizations, it is customary for the papers which are presented to be furnished to the members in advance of the meetings for the purpose of allowing them to thoroughly inform themselves upon the subjects presented. This is done also in many other organizations, and the practice serves its purpose admirably. The members who take part in the discussions must necessarily study them in advance, and the question arises as to why so much time of the conventions should be taken up by reading the reports in full. The idea that it is in any degree a compliment to the author of a paper or of the report of a committee to be allowed to read it in full before the organization to which it is presented, is not now held by the largest and most influential technical organizations, and the method of presenting the papers by abstract have been substituted. This plan serves to refresh the minds of the members as to the general features of the subject and without, the wearying process of listening to the whole. The time of the association would be saved, the "meat" of the papers would be presented, and the discussion of more subjects would therefore be possible, if this were followed. An excellent plan has been suggested, and for which no credit is claimed here, which consists of an arrangement for the presentation of abstracts of such reports as would take more than a few minutes to read, the executive committee to decide upon those which should be presented in brief, and request the author or chairman presenting such papers to read them in this manner. This paragraph is prompted by the long time occupied by the presentation of several of the reports at the recent Master Car Builders' convention at Saratoga. The Master Mechanics' Association avoided this by passing a motion at the opening of the meeting which provided for reading brief abstracts of the reports, and the plan accomplished the purpose for which it was intended. It should always be employed systematically at such meetings.

## CLEAN BILLS OF LADING.

IN our issue of May 23, appeared an article setting forth a possible means of enabling western grain shippers to secure from the railroads clean bills of lading for grain, wherein it was suggested that if an automatic scale (of which there are several reliable ones obtainable) were so placed in an elevator as to be under the control of the railroad station agent, thus enabling him to ascertain without question the exact weights loaded into cars, a clean bill of lading might be insisted upon. The *American Elevator and Grain Trade*, while indorsing the proposition that shippers are entitled to clean bills of lading, objects to the condition suggested as unnecessary. It holds that as shippers "provide warehouse for storing, and facilities for loading their own grain it would be a little too much to insist upon their providing a special kind of scale for the exclusive use of the local freight agent," and suggests that the RAILWAY REVIEW is impressed with the idea that "all grain shippers are dishonest; railroad agents alone are honest."

Our contemporary does not appear to have exercised its usual fair mindedness or perspicacity in this matter. It is not believed that journal will claim that a railroad agent should give a receipt for a

specified amount of grain simply upon the word of the shipper. The question is not one of integrity, but business. To demand a receipt without the possibility of requisite knowledge on the part of one who gives it, would be the height of absurdity; and if given would be practically worthless. The prerequisite to a clean bill of lading is knowledge on the part of the railroad company as to the actual quantity delivered to it. As elevators are now operated at railway stations this is manifestly impossible and hence the necessity for providing some means whereby the difficulty may be overcome.

IN a question of this kind, both sides must be considered. It is probably true that as a matter of abstract obligation a railroad company would be obliged to furnish facilities for receiving, handling, and loading bulk grain in car loads, but it is not to be obliged to receive such freight by the wagon load and furnish storage until a car load can be accumulated. Because of this fact, the present system of dealer's elevators located upon railroad rights of way has been developed, as a kind of compromise, and under this system certain practices designed to accommodate the shipper in the sale of his grain, have been instituted. Among such practices are what is known as "track delivery," the "holding out of grain for inspection," the delivery to elevators on other tracks than its own, etc. The greatest good to the greatest number is what should be aimed at, and in the working out of this proposition concessions must be made on both sides. Clean bills of lading are a desideratum, but the question for shippers to decide is whether they are willing to provide such conveniences, and make such sacrifices of present facilities as are necessary to secure them. If so the first thing to be done is the supplying of some means whereby the railroad can ascertain the exact quantity loaded in the car, and the second will probably be the surrender of certain terminal facilities which are supposed to be of advantage in the way of sale.

There is another thing which may possibly have a bearing upon this controversy. It is not altogether certain that a railroad company is obliged to issue any bill of lading whatever for property delivered to it for transportation. It may be that having for so many years followed this practice, custom may be held to take on the force of law, but if a man is not obliged to give a receipt for money paid, it might be difficult to establish any obligation on the part of the railroads to give a receipt for property delivered to it for transportation. The whole matter is one to be approached in the spirit of fairness. Extended experience in the railroad service warrants the statement that railroad companies, as a rule, desire to treat their patrons fairly, and are willing to join in any feasible scheme for the improvement of the service.

## THE REPORTS OF THE MASTER MECHANICS' ASSOCIATION.

A criticism of convention papers which is frequently made, and with justice, is that many of them do not give the thought and the conclusion of the authors with regard to the work described. It is impossible for a reader to see all of the factors in a subject which involves tests or experiments, and these also need to be digested for the benefit of those who are to read. The practice of publishing papers in advance of meetings will not avail to lead to a satisfactory understanding of a committee report unless the opinions of the committee are summed up and the conclusions and limitations stated. It is getting to be better appreciated that reports should be accompanied by "conclusions," and there is no difficulty in seeing that such reports are the ones which attract the attention of a convention because of their completeness. The work of committees is often of the nature of original research, and those reports which go to the bottom of the subject and show forth all that can be learned about it, and which for this reason do not need to be repeated are the most valuable in the records of the proceedings of technical associations. Noteworthy examples of papers which comply with this requirement, and which may be considered as reference literature upon their respective subjects, are the reports of the committee on the design of axles for eighty thousand pound cars which was read last week before the Master Car Builders' Association, the report of last year to the Master



Mechanics' Association upon the wear of driving wheels and the report of this session, upon "Stacks and Exhaust Passages." The value of these reports lies in their completeness which will render it unnecessary to repeat the described work for any purpose.

The report on "Stacks and Exhaust Passages" is a remarkable work, and the conclusions which the committee have drawn from the data indicate that an immense amount of investigation must have been made to establish the points which are mentioned. It is simply out of the question even for a body of men such as are the members of the Master Mechanics' Association to understand the bearings of the results of this investigation without taking some time for its consideration. Perhaps it is not stretching truth to say that a year's time, which was given by the action of the association, necessary for a satisfactory study of the report. At all events, the ground was covered fully and all the necessary data recorded which places the record of these tests beside that of the Von Borries-Troske experiments, and the work of this committee does not suffer in comparison. It has been suggested by several members of the association that the reports are tending more and more toward scientific, or as they have been called, "fine haired theoretical" investigation, to the exclusion of practical consideration. Taking the report referred to as an example of work which is not practical is a mistake, which should be seen by considering the conclusions of the committee. What is more practical, for instance, than the positive information as to what the form and arrangement of the stack and front end appliances should be in order to get the strongest action on the fire without back pressure? This was the object of the committee, and it was attained in a manner which easily places this report at the top of reports of recent investigations.

The committee on the counterbalancing of locomotives presented a practical paper with a basis of a large amount of experience which was described by various members and after consideration by the committee was presented with recommendations derived from a careful study of all of the methods of balancing; from this a plan was arranged and proposed, which was considered applicable to all conditions. Special attention is attracted by the cautious and limitations which the committee found necessary to state, and which should prevent mistakes due to incorrect use of the method suggested. The recommendations to "make reciprocating parts as light as possible" and to "spread cylinders as little as possible" are valuable additions to a rule for counterbalancing and they should be continually borne in mind when designing and rebalancing locomotives. The report is accompanied by a suggestion that before the adoption of the recommendations of the committee the plan should be given practical trials by several different roads, an excellent method of combining theory with practice, and it is likely to result in a considerable "clearing of the air" in regard to the proper method of balancing. The consideration of the weight of the locomotive in determining the amount of weight which may be left unbalanced is not entirely new, but this is an item which must be given due regard for the reason that upon the ratio of the amount unbalanced to the weight of the engine depends the question as to whether the driving wheels will leave the rails or not. The rules submitted by this committee are clear and exceedingly practical and they are founded upon good bases. What can be more direct and simple than the following, quoted from the report? "First, divide the total weight of the engine by four hundred, subtract the quotient from the weight of the reciprocating parts on one side, as found above, including the front end of the main rod. Second, distribute the remainder equally among all driving wheels, adding to it the weight of the revolving parts for each wheel. The sum will be the counterbalance required if placed at a distance from the wheel center equal to the length of the crank".

The subject which may be considered the most important of those presented at this convention in its bearings upon the work of the members is that upon the "Apprentice Boy," and a general awakening of interest is apparent in the direction of improving the condition and the efficiency of the shop employees through efforts to properly train those who are to

take the places in shop forces, and to show that this, not only in this country but abroad, has been for a considerable time a live question, the following is quoted from a paper by Mr. Sauvage, assistant engineer for rolling stock on the Western of France Railway:

"The International Railway Congress held at Milan in 1887, and in Paris in 1889, examined the question of apprenticeship. At Milan, the congress carried the following motion: 'It is considered advisable to institute in connection with railway administration, special schools for the instruction of railway employes and mechanics. The congress recognizes with satisfaction the tendency of some administrations to recruit their staff, as far as possible, from among the younger members of families of mechanics and employes, and to admit to their schools the sons of their workmen.'"

The report of the committee on the "Apprentice Boy" naturally divides itself into two parts; first, the consideration of the proper method of training boys in shop work, and second, in the educational lines not directly concerning the practical shop work. The committee gave considerable attention to the second, or as it may be called, educational feature, and the statement was made that the practice of different roads in respect to the shop training of apprentices was so varied that no report could be made upon this point. This is the really important part of the apprentice system and the starting point in the establishment of a plan for educating boys. The greatest difficulties perhaps are that for getting apprentices of the proper qualifications, and then to inaugurate a system which shall prove successful as to education and in keeping the boys with a feeling of loyalty after the service of the fulfillment of term of apprenticeship. The growing scarcity of properly qualified machinists and other shop men render this question of sufficient importance as to cause surprise that the committee should have lost sight of their part of the problem. One of the most important matters concerning the apprentice question is the determination of the method of shop education. The selection of the proper instructors and the arrangement of a plan for the instruction of the boys in such a way as to be broad and cover all the work of the shop, in contrast to the old plan of keeping boys for a long time at such work as bolt cutting and nut tapping are perhaps not given the weight which they deserve. In Europe the best men in a shop are detailed as special instructors and give their entire time to the boys, either in a special shop or in a part of the regular shop specially set apart for the purpose. The relations of employes of railways in Europe to the employing companies are different from those obtaining in this country. There the employes are expected to look to the railways for their education, as may be seen by the paper of Mr. Sauvage referred to, and while special shops and the elaborate systems in use there are not applicable to our conditions, there is yet much which may be learned from their thoroughness in the planning of this educational department. The statement of the committee that the day of indentured apprenticeships is past is open to question. The older form of indenture may not be revived owing to the changed and continual changing of conditions, but the idea should not be allowed to prevail that the educational features of this problem are the only ones necessary to look after. The committee would distinguish the full fledged mechanic from the able mechanic, and the special tool man and the skilled laborer; the latter being considered an ordinary mechanic, and the report for next year will be watched for with interest in the hope that the committee will then state the manner of producing the able mechanic. This surely will not be accomplished by the class-work alone.

The most important of what may be considered the minor reports was that upon locomotive cylinder bushings. Mr. Barr stated the essence of the arguments in favor of the application of false valve seats and cylinder bushings to new locomotives by comparing cylinders to car and truck wheels in which it had for a long time been found necessary to provide an entirely different kind of metal in the parts subjected to rail wear from those which are employed to transmit the loads from the axles to the treads. A cast iron wheel is not adapted to the purposes of present practice until the tread is hardened and put

into the proper condition for running under heavy weights by the process of chilling. The application of this principle has been advocated by this journal in respect to cylinders and valve seats where it appears to be equally desirable. If it was ever possible to secure cylinder castings of such a texture, if the term may be used in respect to cast iron, as to give the requisite toughness and also to be hard enough to receive the polish from the piston necessary to reduce friction it is becoming more and more difficult to provide them with the present large sizes of cylinders and the greatest trouble is to get them tough enough to prevent cracking without considering the wearing qualities. With the use of bushings and false seats, however, the cylinders may be made strong enough and the bushings and seats may be made hard, even to the extent of using steel borings in mixture with a hard cast iron. The gain is double in that there is greater freedom from broken castings and also from a material reduction in internal friction of the engine, owing to the smooth surfaces obtained. The cost of applying bushings and seats does not exceed one hundred dollars for an engine, and why not apply them to new engines, thus obtaining the advantage from the reduced friction from the start. It has even been suggested by Mr. Robert Quayle, superintendent of motive power of the Chicago & Northwestern Railway, that cylinders should be made of cast steel, which would offer the further advantage of lightness with increase of strength.

#### RAILWAY MASTER MECHANICS' CONVENTION REPORTS OF COMMITTEES.

##### EXHAUST PIPES AND STEAM PASSAGES.

The conclusions of the committee on "Exhaust Pipe and Steam Passages," together with the diagrams of the stack and the arrangement of the front end appliances recommended by the committee are as follows, the first set of conclusions having been derived from the work done by the committee at Purdue University:

1. The action of the exhaust jet within the stack is not that of a piston within the barrel of a pump.
2. Draft can as well be produced by a steady flow of steam as by the intermittent exhaust jet.
3. The exhaust jet, under ordinary conditions, does not fill the stack until near its top.
4. The vacuum within the stack at points near its base, is greater than that within the smokebox.
5. The jet acts upon the smoke-box gases in two ways; first, by frictional contact, it induces motion in them, and second, it enfolds and entrains them.
6. In all jets examined, the induced action was relatively strong and the entraining action weak.
7. Any condition which will tend to solidify or to reduce the spread of the jet appears to effect favorably its efficiency.
8. Changes in stack proportions may greatly affect the form of the jet.
9. In general, a change in the amount of steam discharged will change the form of the jet; the spread being reduced as the volume of steam is increased.
10. Other things being the same, the form of the jet is not much affected by changes in speed or of cut-off.
11. The form of the nozzle has much to do with the form of the jet, and hence with its efficiency.

The work on the Chicago & Northwestern testing plant relates principally to the proper design of an exhaust pipe and nozzles for maximum efficiency, and the results obtained are believed to confirm the following conclusions, all of which are established only within the limits of the experiments, and for an arrangement of smoke-box, boiler, flues, etc., shown in Appendix B.

1. The exhaust pipe should be as short as possible with a proper arrangement of diaphragm and netting, provided this does not make it less than 19 in. high, which was the lowest limit tested.
2. The bridge in this pipe should be not less than 13 in. high.
3. The area of each of the openings of the pipe at the most contracted part should be not less than the area of the nozzle.
- (This conclusion may only be true for the particular form of pipe and location of the choke used in the above experiments).
4. When it is necessary to reduce the area of the exhaust opening, it should be done at the nozzle and not at the choke.
5. The nozzle should be raised when necessary by lengthening the portion of the pipe above the top of the bridge, rather than that below.
6. The form of exhaust tip shown as tip X in these tests gives better results than either forms Y or Z.
7. The distance from the choke of the stack to the nozzle for 14 in. choke stack 52 in. long should not exceed 50 in., nor be less than 40 in. for maximum efficiency.
8. The distance from the top of the smoke arch to the nozzle with 14 in. straight stack 52 in. long, should not be greater than 38 in. nor less than 23 in.
9. The distance from the top of the smoke arch to the exhaust nozzle with a 16 in. straight stack 52 in. long, should not be greater than 38 in. nor less than 28 in.



10. The efficiency of the steam jet is reduced by spreading it by means of cross-bars in the nozzle.

11. Cross-bars not wider than  $\frac{3}{8}$  in. placed in the nozzle or above it nearer than 1 in. increase the back pressure; wider cross-bars increase the back pressure when further removed in proportion to their width.

12. A petticoat pipe with a single nozzle, when properly arranged, increases the efficiency of the jet.

13. Double nozzles with 14 in. choke stack and 16 in. straight stack, 52 in. long, are not as efficient as single nozzles, the difference being very slight.

14. Double nozzles should be located with reference to the stack the same as single nozzles.

*Van Borries-Troske Tests.*—Conclusions from the Van Borries-Troske tests on the effect of various lengths of conical and cylindrical stacks:

15. The maximum height of stack, measured from the exhaust nozzle, if the diameter at the choke is properly chosen need not exceed five times this diameter. For cylindrical stacks the ratio of diameter to height is the same.

16. The vacuum decreases as the stack is shortened, and more rapidly with cylindrical than with conical stacks.

17. The decrease in vacuum due to shortening the stack within certain limits can be nearly overcome by lowering the nozzle. The amount which the nozzle should be lowered with cylindrical stacks is almost equal to the amount the stack is shortened. With conical stacks the nozzle should be lowered about two-thirds as much as the stack is shortened.

Plate 48 shows the arrangement of exhaust pipe, nozzle, petticoat pipe and stack, which gave the best general results as to vacuum and efficiency in the commit-

tee's tests. In boilers of smaller diameter, a petticoat pipe is probably of little or no service. The committee's tests are not sufficiently comprehensive to give the limits of this adjustment. They indicate, however, that the top of a 13 in. top section should not be higher than 2 in. below the top of the smoke-box with 14 in. choke or 16 in. straight stack.

5. The 14 in. choke stack could probably be shortened without materially affecting the vacuum. By how much the committee's tests do not show. A straight stack must be larger than 14 in. diameter, but neither 14 in. or 16 in. straight stacks give as good results as the choke stack, although the 16 in. straight stack shows much better results than that 14 in. in diameter.

The tests undertaken at West Chicago shops, were made upon Chicago & Northwestern engine 797, a ten-wheel Schenectady locomotive, with 19 x 24 in. cylinders, 56 in. driving wheel centers, having an eight foot fire-box, 40 $\frac{3}{4}$  in. wide, located on top of the frames. This locomotive was taken out of service after having made about five thousand miles since having had general repairs, and put upon the locomotive testing plant at West Chicago shops.

The engine was fitted with five U tube draft gages, two connected with the smoke-box, and three with the fire-box. The fire-box was adapted to burn crude petroleum, which was used as fuel throughout the tests.

A Boyer speed recorder, attached to the testing plant, was used to check the constancy of the speed, its indications being also checked by an actual count of the revolutions per minute, during each of the observations.

Two Bristol automatic recording gages were also connected with the engine, one indicating the steam boiler pressure; the other connected to the exhaust cavity in the

tively. These readings were also uniform, and average between 33 and 40 per cent of the vacuum in the smoke-box.

In order to preserve a constant condition of opening through the grate in fire-box, the engine was fitted to burn oil by placing two crude petroleum oil burners through 2 in. combustion tubes in the lower part of the back head. These boilers directed a spray of oil against the under side of the brick arch, with which the engine was fitted, the space between the lower part of the arch and the fire-box being closed by means of a fire-brick wall. The entire grate was bricked over with fire-brick, except an opening of about 100 sq. in. area in the front center.

The desired conditions of speed and steam pressure having been obtained, a bell signal was given by the man in charge, notifying all observers that a series of tests was about to begin. The observer at the vacuum gages connected to the smoke-box, started the revolution counter, as soon as the vacuum gage indicated constant conditions had been reached; he then signalled, by means of two strokes on another bell, to all other observers to prepare to take readings. A moment afterwards, at a single stroke of the bell, readings were taken simultaneously from all vacuum gages, the steam pressure gage and the Bristol gage connected with the exhaust cavity. This observation was repeated, at intervals of about one minute, four times, the last two observations being accompanied by indicator cards, taken simultaneously from both cylinders.

Typical indicator cards, taken from both cylinders, are shown, as well as diagrams from the Bristol automatic recording gages, giving steam pressure in boiler, and the back pressure in exhaust cavity connected with the left cylinder.

A typical diagram from the Boyer speed recorder is also shown; the speed, it will be seen from this record, was maintained almost absolutely constant; in fact, so constant was it that from actual count of the number of revolutions a variation of three revolutions, above or below 188 per minute (the number required to maintain a speed of 35 miles per hour) was only reached a very few times in the entire series of experiments. It was not at all unusual for the engine to run an entire day with a variation of but one revolution per minute, above or below the number required for the correct speed. On account of the constancy of the speed, it is unnecessary to consider it as anything but a constant factor in these tests; it is consequently omitted from the diagram.

#### THICKNESS OF ENGINE TRUCK WHEEL FLANGES.

It may be well to preface our report with a brief statement of the occasion of the appointment of a Committee on this subject. At the last convention, at Alexandria Bay, a communication was received from Mr. T. J. Hatswell, master mechanic of the Flint & Pere Marquette Railroad, asking that this matter of the thickness of engine truck wheel flanges be discussed. It appears that Mr. Hatswell had had a difference of opinion between himself and the Railroad Commissioner of the State of Michigan, arising from an accident on his line by the derailment of an engine at a frog on a perfectly straight track, which was attributed to a thin flange on the engine truck wheel. The wheel in question was steel tired.

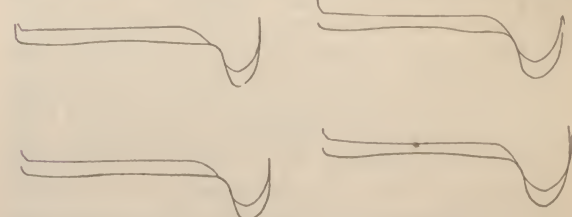


FIG. 1.—RECOMMENDED FRONT END ARRANGEMENT.

tee's tests. An inspection of the results of the tests in Part II will show that certain variations from the above change but slightly the effectiveness of the draft appliance. The limits within which the different parts experimented with can be changed without materially affecting the efficiency of the apparatus as a whole, are as follows:

1. Height of the bridge should not be lower than that shown, although lowering it decreases the efficiency but little.

2. Distance of the nozzle from the choke of the stack can be from 49 in. to 39 in., preferably nearer the former than the latter.

3. The area of each opening at the choke or pipe can be decreased below the area of the nozzle as much as 20 per cent, without greatly decreasing the efficiency at speeds and cut-offs experimented with. Preference to the larger opening should be given with engine working generally at short cut-offs.

4. The petticoat pipe can be made to considerably increase the efficiency of the draft apparatus in boilers of this diameter and probably larger, but it must be carefully adjusted to the exact draft conditions of the engine. This can probably only be done with the engine in actual

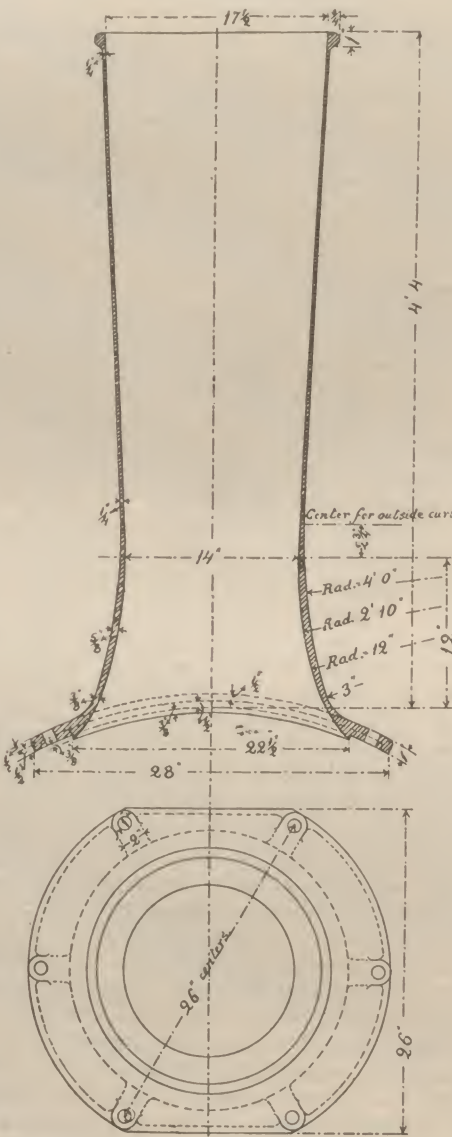


FIG. 2.—RECOMMENDED FORM OF STACK.

left cylinder saddle, recorded the pressure of the exhaust steam at that point. The readings of the oiler pressure gage were also checked with the regular locomotive steam gage, both gages being carefully tested before and after the experiments were made.

Indicator cards were taken from both the right and left hand cylinders; the right hand cylinder cards were taken with a ten pound spring, blocked at about 20 lbs., in order to show the back pressure accurately. The left hand cards were regular indicator cards, with 100 lb. spring. A revolution counter arranged to be started and stopped, was attached to right indicator reducing motion.

The vacuum in the smoke-box was that shown at a point about 3 in. inside of the smoke-box wall, about in the center line of the boiler, and midway between the flue sheet and front door. Observations of vacuum were independently made at various other points on a horizontal plane, midway between the center and bottom of the boiler and just forward of the deflector plate. These observations were in general slightly lower than those near the outer wall, but only from 1-20 to 1-10 of an inch of water, rarely 2-10, and were often the same. The vacuum was also observed at three points on left side of fire-box, the vacuum gages near the front, center, and back end of fire-box respec-

The flange of the wheel, measuring by the gage, was 13-16 of an inch, which Mr. Hatswell considered perfectly safe in running. The Commissioners fell back on the M. C. B. Rules, claiming that they recommended wheels to be condemned with a flange 1 inch in thickness, and that a steel tired wheel ought not to be rated with a flange thinner than a cast iron wheel. The convention did not take the matter up at the time (see p. 274 of M. M.

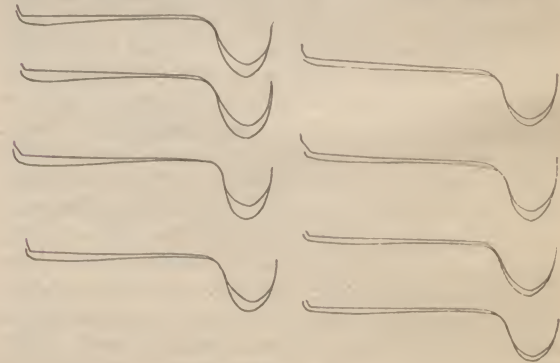


FIG. 2.

Report for 1895), but the topic was later on assigned to your committee.

We have made rather extended investigations and find a considerable variance in practice. We find the allowable thickness to vary from 3-4 to 11-8 inches in steel wheels, and from 7-8 to 13-16 inches in cast iron wheels, a range for which there seems to be no good reason. There is a considerable number of mechanics who follow the practice of permitting a thinner flange in steel wheels than on cast iron wheels, and we confess that your committee started its work of investigation with a bias in



favor of this practice. It seemed at first that a steel tired flange could be worn thinner than a cast iron flange, inasmuch as in condemning one the reasons were entirely different; that is to say, a cast iron flange ought to be condemned when it developed wear, on account of its liability to break, whereas a steel tired flange ought to be condemned when it showed wear, not on account of its liability to break, but on account of its liability to climb the rail through being sharp. We very shortly changed our views of this matter, however, and now think it can be demonstrated very clearly that there should be but one thickness as a minimum for a leading engine truck flange, whether the material is cast iron or steel. In support of this view, we submit tracings that show that by allowing even moderate wear to steel flange, the wheel will give out much more rapidly, owing to the quantity of tread surface that subsequently has to be turned off and thrown away, in order to produce a standard thickness of flange.

These tracings show the outlines of a number of coach tires which were taken on the C. B. & Q. Ry. several years ago by Mr. A. Forsyth, master mechanic of that road. We append a letter from Mr. Forsyth, which, with the accompanying drawings, we believe fully demonstrates the correctness of our position.

## CONCLUSIONS.

To sum up, your committee would definitely recommend:

1. That the minimum thickness of leading engine truck wheel flanges should be the same for both iron and steel wheels.

(Note.—In recommending that the steel flange limit be the same as in cast iron, the fact that the strength of steel admits, with perfect security, of a thinner flange has not been lost sight of by your committee. Our recommendation is based purely upon economical considerations as to tire wear.)

2. That the minimum thickness be 1 in., measured at a point  $\frac{3}{4}$  in. from the top of flange, as shown on the appended diagram. (This diagram was published in the RAILWAY REVIEW of April 25, 1896.)

AURORA, ILL., May 18, 1896.

Mr. G. W. RHODES,

Supt. M. P. C. B. &amp; Q. Ry., Aurora:

Dear Sir—Replying to Mr. Crosman's communication attached. Up to 1890 it was our practice on the C. B. & Q. to run steel tired wheels as long as they could possibly run with safety. This was done with the idea that we were getting more mileage out of the steel tires by so doing. During the year 1889, I took contour lines from every steel tired wheel that came to the shop for tire turning, and in April, 1890, the matter was brought to the attention of the C. B. & Q. Master Mechanics' Association, and blue prints of 171 tires as they arrived at the shop, and the amount of metal that had to be turned off the tread in order to make a good flange, were presented at that time.

In order to illustrate this, I have selected from these contour lines (Fig. 1), and present on the enclosed drawing, twelve extreme cases which show the enormous amount of metal wasted from the tread of the steel tired wheels by allowing the wheel to run until it has a very thin flange.

On the second drawing (Fig. 2) I have shown selected contour lines of sixteen steel tired flanges that had commenced to develop flange wear. At our master mechanics' meeting, it was decided that it was not economical to allow flange wear on steel tired wheels to get any worse than is shown in this drawing.

A. FORSYTH.

## CYLINDER BUSHING.

A circular of inquiry was forwarded to the members of the association, to which 24 replies were received from members who have cylinder bushings in use, and about as many from those who have no experience with cylinder bushings.

The statement attached gives a resume of the replies from the 24 referred to. In this statement the number of engines equipped with bushings is given in the first column, and the names of those reporting are arranged in accordance with the number of engines with bushed cylinders in service. In all cases the experience in the use of bushed cylinders has been entirely satisfactory.

The column headed, "Thickness of Bushings," gives the thickness in use as far as your committee was able to determine it from the reports. It will be observed that the thickness in use varies from one-half inch to 1 in.

The number of port bridges varies from 1 to 3.

The column headed "Fastenings," is intended to show the manner in which provision is made to prevent the bushing from turning. Only four report using a device of this kind. The fastening caused by the pressure of the cylinder head against the bushing seems to have been sufficient to prevent any trouble.

Under the head of "Desirable" is given the expression of the opinion of those reporting as to the desirability of using cylinder bushings, and all the members who have had considerable experience with bushed cylinders are unanimous in favor of their desirability.

The columns headed to be used in case of, with the sub-columns represent the opinion, as far as it could be obtained from the reports, of the cases in which it is desirable to use bushings.

One member reports that he considers that it would be desirable to design cylinders originally with the object of bushing when worn. It will be observed that two members report in favor of bushing new cylinders.

The three drawings accompanying this report, numbered 1, 2 and 3, represent in general the idea of the members reporting, as to the manner of constructing the bushing.

Fig. 1 shows bushing extending from the front head to the back head. A large number of those reporting favor this construction.

Fig. 2 represents a bushing terminating at the inside of the port of the back head. Several members recommend this practice.

Fig. 3 represents a proposed construction by one of the members, in which a collar in the front end of the bushing is formed to bear the pressure of the front head, and to avoid the necessity of bridging the port. The only question in this construction is the possibility of steam escaping between the port and the bushing.

Those recommending the use of bushings for new cylinders do so on the following considerations: The

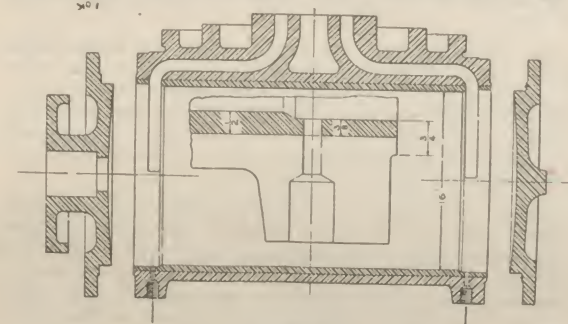


FIG. 1.

qualities required in a cylinder casting in order to withstand the strain to which it is subjected, are especially strength and toughness. These two qualities are, however inconsistent with the hardness that is necessary to secure a good smooth polish in the bore of the cylinder. In the attempt to obtain a good wearing surface in the cylinder, the casting has a tendency to become of such a character as is liable to crack in service.

By the use of an independent bushing a perfectly clean casting of uniform density throughout, and of such a hardness as will give the best results as to wear, can be obtained without in any manner influencing the quality of the material in the body of the cylinder.

A number of the members having called attention to the trouble arising from the cylinder being soft, especially with reference to rapid wear and necessity for frequent re-boring of the same. It should also be borne

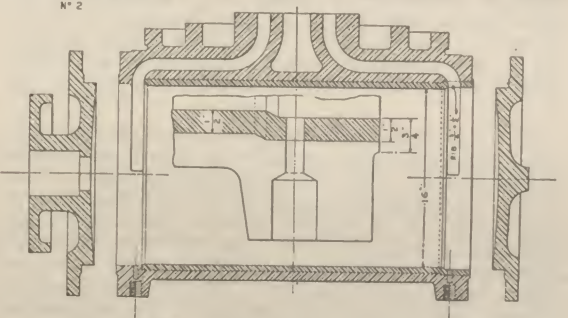


FIG. 2.

in mind that frictional resistance between the cylinder and the piston consumes a large amount of power, and any means which will reduce this resistance is likely to produce a freer working engine, and one more economical in consumption of fuel and oil.

Some members of your committee are decidedly of the opinion that the advantages gained by using a bushing harder than it is possible to obtain in the ordinary cylinder casting, effect a decided economy in the above respects.

In this connection your committee desire to call attention also to the matter of false valve seats. If these are made separately they can be made much harder than the ordinary solid seat. The false seats are not constructed in such a way as to give practically no trouble, and with the adoption of the false valve seats, and a cylinder bushing of the proper hardness, the entire wearing parts

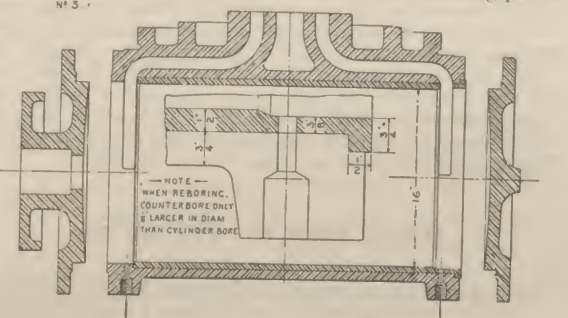


FIG. 3.

of the cylinder would be fully provided for, and the failure of the cylinder would simply depend on its power of resisting the strains to which the body is subjected in service.

In the operation of fitting and bushing the cylinder, two of the members report that the bushing is turned to 1-100 in. larger in diameter than the bore of the cylinder. The majority however report turning the bushing to practically the same diameter as the fit in the cylinder. One member advises banding the cylinder in order to overcome the bursting tendency of the bushing. A few of the members recommend doweling or a similar device to prevent bushings turning. The majority of the reports however would seem to indicate that this is unnecessary.

In order to place the bushing readily in position, the cylinders are heated, either with steam or a charcoal fire. The bushing in some cases is cooled by special means, but the general experience indicates that slight heating of the cylinder is sufficient to permit the bushing to be placed properly in position without any special difficulty.

In conclusion, your committee would summarize as follows:

1. The cylinder bushings one-half inch to three-quarter inch in thickness will meet all requirements.

2. The bushings should be turned to the same diameter as the cylinder fit.

3. Bushings fitted as in Figs. 1 and 2, without any fastening except the pressure of the heads, will give perfectly satisfactory results.

4. The use of bushings is a practical method of reducing the bore of cylinders, of repairing cracked and worn cylinders and avoiding the difficulty of the cylinders which are too soft.

5. The question of fuel and oil economy, which may be obtained by the use of hard, homogeneous bushings, is one which should receive careful attention.

## SUMMARY OF REPLIES TO CIRCULAR ON CYLINDER BUSHINGS.

No. of Engines Equipped with Bushings	Experience	Thickness of Bushings	Port Bridges	Fastenings	Desirable	To be Used in Case of			
						Over-Cylinders Eng. nes.	Worn Cylinders	Cracked Cylinders	New Cylinders
C. M. & St. Paul	99	Good	$\frac{1}{2}$ to $\frac{3}{4}$	1	Yes	x	x	x	x
Penna. Co.	91	"	$\frac{1}{2}$ to $\frac{3}{4}$	1	Yes	x	x	x	x
A. T. & S. F.	50	"	$\frac{1}{2}$	Dowel	"	x	x	x	x
C. N. W.	50	"	"	"	"	x	x	x	x
C. & A.	25	"	"	"	"	x	x	x	x
C. C. & St. L.	20	"	"	"	"	x	x	x	x
P. & W. L.	15	"	"	"	"	x	x	x	x
M. & St. L.	10	"	"	"	"	x	x	x	x
M. & W.	10	"	"	"	"	x	x	x	x
St. L. & S. W.	7	"	"	"	"	x	x	x	x
Can. Pac.	5	"	"	"	"	x	x	x	x
C. & St. L.	5	"	"	"	"	x	x	x	x
Northern Pac.	6	"	"	"	"	x	x	x	x
Beech Creek	5	"	"	"	"	x	x	x	x
B. C. R. & N.	5	"	"	"	"	x	x	x	x
T. H. I.	4	"	"	"	"	x	x	x	x
U. P.	3	"	"	"	"	x	x	x	x
C. R. & L.	3	"	"	"	"	x	x	x	x
D. S. S. & A.	3	"	"	"	"	x	x	x	x
D. R. & C.	2	"	"	"	"	x	x	x	x
B. H. & C.	2	"	"	"	"	x	x	x	x
Old Colony	2	"	"	"	No	x	x	x	x
C. R. R. of N. J.	1	"	"	"	Yes	x	x	x	x
S. A. & A. P.	1	"	"	Dowel	"	x	x	x	x

## DRIVING BOX WEDGES.

Your committee has received forty-nine replies to its circular of inquiry. Forty came from our members, representing barely seven per cent of our total membership, and nine replies came from mechanical superintendents of European railways.

The experience of 41 per cent has been exclusively with wedges, and 59 per cent with other types. In expressing their preference, 53 per cent say that a fixture is the best practice, and 47 per cent favor the wedge. Analyzing these replies, it is noticed that seven who vote for the use of the wedge say that the enginemen do not, or cannot, move them, so that to us it seems that the vote should read thus, thirty-three for fixture and sixteen for movable wedge.

Only one man with a varied experience reports going back to the use of a wedge; but as he does not allow enginemen to touch them, it appears to us if he now uses tapered liners instead of parallel liners, for making shop adjustment of jaw faces.

Of the twenty who, when our circular was issued, had no experience with stationary wedges, seven said they would experiment and report results, one man, of little faith, being candid enough to say such experimental work would be thrown away, and five did not favor any experimenting.

No statements showing the results of such recent experiments were received by us in time to embody in this report, but no doubt we shall have them in the discussion.

The general opinion as to the fit of the axle-box, between the jaws, for engines not fitted with movable wedge, is that it should be so close as to require a bar three feet or more long, with a leverage of four to one, to move the box up, and that it should just carry its own weight, or move downwards by hand pressure. This means that there should be barely 1-100 of an inch difference between the box and the jaw faces. Some replies go on to say that, in addition to this, the axle box should have a hub clearance of a sixteenth of an inch, and that the flanges should be tapered or beveled on their length so that rocking may not chip off the ends of the flanges.

Engines fitted with a bare 1-100th clearance, should not be run with maximum load at full speed the first two trips after leaving repair shop.

Only thirteen ascribe any of their troubles with hot axle boxes to maladjustment of movable wedges by enginemen.

Thirty-three replies 67 per cent say that it is admissible to take from enginemen the opportunity of varying the distance apart of axle centers, when solid-ended side rods are used.

The replies to question seven are so indefinite and scattering that we cannot say whether the axle box flanges have a longer life with fixed jaw faces than they have with movable wedges.

As to probable increase of frame fractures and failures, nine say they would be increased by dispensing with the movable wedge, and twenty-three say they would not; also twenty-three think the mileage between each shop repair would be increased, and thirteen think mileage would be lessened by dispensing with movable wedge.

In the use of steam, nine think engine would be more wasteful if movable wedge was dispensed with, and twenty-three are of a contrary opinion; others say they do not know and need more experience with fixed wedges.

In conclusion, the strongest point the replies justify us making is that those who dispense with movable wedges do not go back to them.

It is open for a new committee to report on the relative value of tapered and parallel liners, and on the wearing value of cast iron, steel and drilled jaw faces.



## PERSONAL.

Mr. Phillip Allen has been appointed superintendent of the Kalamazoo division of the Michigan Central.

Mr. J. W. Nokely has been appointed traveling auditor of the Chesapeake & Ohio, with headquarters in Richmond, Va.

Mr. W. B. McClellan has been appointed general passenger agent of the Hoosac Tunnel & Wilmington, in Vermont.

Mr. J. B. Ryan has been appointed trainmaster of the Chicago division of the Peoria, Decatur & Evansville Railroad.

The title of Mr. O. B. Law traveling freight agent of the Columbus, Hocking Valley & Toledo, has been changed to that of northern freight agent.

Mr. William S. Nevins, formerly of the Lehigh Valley, has been appointed contracting freight agent in Buffalo of the Great Northern Steamship Co.

Mr. E. M. Stanton has been appointed car service agent of the Alton Terminal Co., with office at Springfield, Ill., vice Mr. D. C. Frederick, resigned.

Mr. H. L. King, late general agent of the Atchison, Topeka & Santa Fe at Atchison, Kas., has been appointed commercial agent of the road at Pueblo, Col.

Mr. Percy White, contracting agent of the West Shore Line at Cincinnati, O., has been appointed contracting agent of the Baltimore & Ohio at Baltimore, Md.

Mr. S. B. Fisher, formerly assistant chief engineer, has been promoted to the position of chief engineer of the Missouri, Kansas & Texas, with office at St. Louis, Mo.

General Manager Charles H. Warren of the Great Northern has resigned as general manager of the Montana Central, which will hereafter be operated as an independent road.

Mr. R. S. Robertson, formerly general eastern agent of the Lackawanna at Chicago, has been appointed west-bound agent of the Traders' Dispatch, with headquarters at Chicago.

On July 1, Mr. A. J. Gibbons will retire as chief engineer of the Vandalia, and his duties will be looked after by Mr. F. T. Hatch, in connection with his duties as superintendent of the Michigan division.

Mr. Gordon G. Noble has been appointed traveling passenger agent for the Lehigh Valley Railroad, with headquarters at No. 228 S. Third street, Philadelphia, Pa. He succeeds Mr. Charles A. Conard, transferred.

Mr. E. Holbrook has been appointed superintendent of the Louisville, Evansville & St. Louis Air Line, vice Mr. J. R. Sample, resigned. Mr. Holbrook was formerly with the Baltimore & Ohio as division superintendent.

Mr. E. M. Laurence, who has been with the Alabama & Vicksburg road, with headquarters in Vicksburg, has been appointed traveling freight agent of the Louisville, New Albany & Chicago road, with headquarters in Memphis.

Mr. George H. Campbell has been appointed superintendent of terminals of the Baltimore & Ohio at Baltimore. He will have supervision over all local freight agencies and the terminals at Camden Station and Locust Point.

Mr. Charles A. Parker has resigned as superintendent of telegraph of the Denver & Rio Grande to accept the position of assistant to the general superintendent of construction of the Western Union Telegraph Co., with headquarters at Denver, Col.

The jurisdiction of Master Mechanic Geo. P. Sweeley of the Eastern division of the Pennsylvania Lines west of Pittsburgh, will be extended to cover the Toledo division, which owing to the recent death of Mr. W. M. Lowe is now without a master mechanic.

Mr. E. B. Evans, for five years contracting agent of the Western & Atlantic at Selma, Ala., will succeed Mr. Geo. B. Tyler as commercial agent of that line in New Orleans. He will be succeeded by Mr. Daniel O'Rourke, chief clerk in the local freight office at Selma.

Mr. Joseph T. Odell has been appointed assistant general freight agent of the Ohio Southern with headquarters at Springfield, Ohio. Mr. Odell has been connected with the general freight department of the Ohio Central lines for eight years, five of which he has been chief clerk.

Mr. William Bailey Thomas, who last October was appointed commissioner of the Southern States Passenger Association, has tendered his resignation to take effect July 1. Mr. Thomas was receiver and general manager of the Atlanta & Florida previous to its absorption by the Southern Railway.

Mr. Horace Tucker has been appointed traffic manager of the Chicago, Hammond & Western Railway, a newly-incorporated company organized to build a belt line around Chicago between the present inner and outer belt lines. Mr. Tucker was for fifteen years general freight agent of the Illinois Central.

Mr. C. F. Wood has been appointed commercial freight agent of the Baltimore & Ohio and the Cleveland Terminal & Valley roads with headquarters at Akron, O. Mr. Wood will charge of Akron, Canton and stations on the Cleveland Terminal & Valley road, South Park to Valley Junction inclusive.

Mr. William Youngquist, for more than 25 years foreman of the Chicago, Burlington & Quincy car department, died at Creston, Ia., on June 22, aged 54 years. Mr. Youngquist was one of the pioneers of Creston, going to

that place to reside when the Burlington was first built in there. His death resulted from paralysis.

Mr. Joseph McWilliams has resigned as general superintendent of the Texas Central Railroad and has been appointed general manager of the Marietta & North Georgia, which is owned by Henry K. McHarg, president of the Texas Central, and his associates. The successor of Mr. McWilliams has not yet been named.

Mr. Horace G. Burt, general manager of the Fremont, Elkhorn & Missouri Valley will succeed Mr. E. W. Winter as general manager of the Chicago, St. Paul, Minneapolis & Omaha. Mr. Burt was formerly chief engineer of the Chicago & Northwestern Railway, and has been in the service of that company and its allied lines more than 20 years.

Mr. John M. Turner at present superintendent of the New Orleans & Western, owing to the resignation of Mr. A. W. Swanitz is, according to the report, soon to become general manager of that road. Mr. Turner was for several years division superintendent of the Illinois Central with headquarters at New Orleans, afterward being connected with various lines in the east.

Mr. R. J. Menzie, who for fourteen years has been connected with the Merchants Dispatch, has been appointed commercial agent of the Baltimore & Ohio at Detroit. As Mr. Menzie was soliciting agent in the city of Detroit for ten years and traveling agent in Michigan for four years, he has an extensive acquaintance in his territory, thus making him a desirable man for the position. His office is at 156 Jefferson street.

Mr. A. J. Richter, of Chicago, at one time city passenger agent of the Pennsylvania lines at Cincinnati, has entered the service of the Columbus, Hocking Valley & Toledo as special passenger agent. Lately Mr. Richter has been assistant chief engineer of the Chicago Union Terminal & Transfer Railway Co., and was engaged in making the estimates for the new switching system in that city. This work having been practically completed he was secured by General Passenger Agent Fisher to assist in passenger work on the Hocking Valley.

A circular has been issued by Mr. J. J. Turner, vice president and general manager of the Vandalia system, appointing Mr. Harry Miller general superintendent of the system, a position which has been vacant since the retirement of Mr. N. K. Elliott, his headquarters to be Terre Haute, Ind. Mr. N. C. Deane is appointed superintendent of the main line, vice Harry Miller, promoted Mr. Deane, who is now general trainmaster of the Panhandle, will be succeeded in that position by Mr. A. Mendenhall.

Mr. W. S. Wilson, president of the St. Louis division of the Central Association of Railroad Officers, has tendered his resignation, to take effect with the election of his successor. It is expected that at the next meeting of the association Mr. W. A. Garrett, superintendent of the Wabash will be made president, and Mr. W. G. Besler, superintendent of the Burlington, elected to the vice presidency, in place of Mr. Garrett. Mr. Wilson was superintendent of the Cairo Short Line before that company was merged into Illinois Central system. Under the new deal the territory under Mr. Wilson's jurisdiction does not include St. Louis terminals, and as he would not be able to attend meetings regularly, he asked to be excused.

Announcement has been made on behalf of the reorganization committee of the Northern Pacific of the appointment as president of Mr. Edwin W. Winter, at present general manager of the Chicago, St. Paul, Minneapolis & Omaha. He will enter on the performance of his duties at an early date, with headquarters at St. Paul. Mr. Winter is recognized as one of the leading railroad men in the west. He has been in continuous railway service since 1867. He was born in Vermont in 1845 and made his way to the far west at an early age. For three years, from 1867 to 1870, he was connected with the construction department of the Union Pacific Railway, and subsequently he was contracting agent on the construction of various lines. In 1876 he became claim agent of the Chicago & Northwestern Railroad, a position which he held until 1879, when he became general superintendent of the West Wisconsin Railway. He has been with the Chicago, St. Paul, Minneapolis & Omaha Co. since 1880. For one year he was the superintendent, and from 1881 to 1885 he was the assistant president. Since 1885 he has been the general manager. During his service with that company he has brought its property to its present prosperity.

## RAILWAY NEWS.

**Chicago & Northern Pacific.**—On Friday, June 19, a petition for decree ordering the sale on October 1 next of the Chicago & Northern Pacific R. was presented to Judge Jenkins in the United States court at Chicago by the Farmers' Loan & Trust Co. the foreclosing trustee. Simon Sterne, of New York, appeared for the holders of all bonds, except 683, whose holders could not be found, but Judge Jenkins was assured that the petition was not designed to freeze out the smaller bondholders. An upset price of \$10,000,000 has been fixed by the company for the property. The reorganization committee of the bondholders now hold 95 per cent. of the securities and it will undoubtedly buy the road. In determining the upset price, it was stated that the stock was valued at 45 cents on the dollar by Wall street men, which would make the property worth 13,000,000. The judicial sale will terminate the litigation which has surrounded the road, which was created by the Northern Pacific officials only for a Chicago terminal.

**Denison & Northern.**—Reports from the Indian Territory country state that work on the Denison & Northern from Dougherty southward is progressing rapidly. Ties are being placed and steel sufficient to lay 54 miles of the road has been contracted for from the Illinois Steel Works and is expected to arrive at Dougherty in a few days, when it will be placed. The prospect for the Denison & Northern to build into Denison this year is thought to be quite flattering.

**New York & Pennsylvania—Olean, Oswayo & Eastern.**—Articles of agreement have been filed with the secretary of state at Albany, N. Y., for the consolidation of the New York & Pennsylvania and the Olean, Oswayo & Eastern roads. The first named company operates a road from Hornellsville, N. Y., to Genesee, Pa., and the Olean Co. has a line from Genesee to Shinglehouse.

**Northern Pacific.**—Work on the branch of the Northern Pacific which is being built to the Castle mines is progressing rapidly. A Montana paper says: "From the mouth of Sixteen Mile creek, hereafter to be known as Castle junction to Smith river the road bed is ready for the ties, excepting through the Foster ranch where the work is stopped on account of a right of way squabble. The short stretch can be finished in a week once it is started and it will be ready by the time the track is laid to it. The work is so far advanced, that it is only a question of weeks when trains will be running to and from Castle. In the mines evidences of activity are visible. Owners are getting ready to extract ores and prospecting for new veins is active. A new wagon road will be laid out that will reach the heart of the district and give the majority of the mines a down hill haul to ore bins to be built by the company. A sampling mill will be put in at the railroad terminus and ore will be sampled and purchased on the spot, which will enable the small miners to develop as they can sell in amounts as extracted and receive cash with which to carry on the work. The railroad will extend ore spurs up Hamilton and Hensley creeks and to Robinson & Smith's camp as the mines prove ability to give tonnage. In the valley the ranchmen are preparing to fill the wants of the mining district in their products, new land is being located, and there is no doubt but Meagher county is entering on an era of great prosperity."

**Philadelphia & Reading.**—Formal legal notices advertising the sale of the property of the Reading R. under foreclosure have been prepared. Under the terms of the foreclosure the sale will take place in Philadelphia, on Wednesday, September 23, and will be organized as follows: The Philadelphia & Reading Railroad and Coal & Iron Cos. will be sold at auction in three parcels. The first comprises the main line and its leasehold interests, 160,000 shares of the Coal & Iron Co. and various securities of controlled lines. The second parcel includes all the coal properties, while the third contains all the securities pledged by the reconstruction trustees as security for the general mortgage. It is expected that the reorganization committee will be the purchaser. A great many alterations and improvements on different parts of the line, are being made among which are the strengthening of bridges, substitution of heavier rails and rearrangement of yards to prevent delay in handling freight and coal traffic. An engine house and turntable are also to be erected at Bridgeport.

**Pittsburgh & Connellsville.**—The Pittsburgh & Connellsville R. (now a part of the Baltimore & Ohio system) has entered into an arrangement for the extension of its \$4,000,000 first mortgage bonds, due July 1, 1898, so that the principal shall become payable in fifty years from July 1, 1896, with interest meanwhile payable semi-annually at the rate of 4 per cent, both principal and interest payable in United States gold coin. This arrangement has been approved by the Baltimore & Ohio receivers. Under this arrangement the bankers offer to holders the privilege to present their bonds on or before July 15 next to be stamped, in which case they will receive \$35 in cash for their July 1, 1896, coupons, and in addition thereto \$37 in cash per bond, which sum equals the difference between 7 per cent and 4 per cent interest on the bonds to July 1, 1898, under discount at the rate of 4 per cent per annum, less \$20 per bond, deducted as a consideration for the extension. The existing 7 per cent coupons for interest from July 1, 1896, to July 1, 1898, will be detached from the bonds and a new sheet of coupons for the interest at 4 per cent for the full terms of the extension will be substituted, such coupon, to the extent of \$15 each, together with the July 1, 1896, coupons, to be held by the bankers under their agreement with the railroad company uncollected, if required, for the period of two years. Bonds of holders not availing themselves of the above privilege will be bought by the bankers at \$1,002 in cash per bond with July 1 next coupons and all subsequent coupons attached.

**Wisconsin Central.**—The new route from Minneapolis to the seaboard via the Wisconsin Central and the Flint & Pere Marquette ferry will be completed and opened for traffic, both freight and passenger, next month. All track laying on the Maitowoc extension will be finished by July 1. This new route to the east and the seaboard will be the shortest in existence. The exact distance between Minneapolis and Buffalo via this route will be 879 miles, as against 947 miles via the present shortest route.

## NEW ROADS AND PROJECTS.

**Florida.**—A new road is being built from Clark to Trenton, both in Alachua county, a distance of about 20 miles. The contract for grading has been let to Mr. Scott Walker, who has a large force at work. Ten miles has already been graded, and is ready for the cross-ties, which will be put down in a few days. The main object of the road is



to tap the heavily timbered section through which it will pass, and for an outlet for the rich deposits of phosphate near the Suwannee river. A rumor is current that the road, when finished, will be bought by the Atlantic, Suwannee River & Gulf R., which will use it as its western extension from Clark to the river.

**Indiana.**—Suit was filed in the Spencer circuit court at Rockport, Ind., June 10, asking for the appointment of a receiver for the Chicago, Indianapolis & Chattanooga Southern, which is projected from Indianapolis to Rockport, Ind., a distance of 165 miles, and a few miles were graded at Rockport last year. The plaintiffs in this suit are laborers who worked upon the grade. The liabilities of the road amount to about \$45,000 and the assets are practically nothing. It is stated that a meeting of the stockholders will be held at Indianapolis, June 22, when propositions for building the line will be received. Mr. F. L. Patrick, of Columbus, Ohio, is president.

**Kansas.**—Contracts for the proposed extension of the Hutchinson & Southern from Cameron, Kan., to Pond Creek, I. T., have been let, and Mr. L. E. Walker, receiver of the road, has been authorized by the court to issue receiver's certificates at the rate of \$6,000 per mile for the construction.

**Mexico.**—The San Francisco Bulletin of last Saturday says: "The negotiations which have been pending for the construction of the railroad to the San Nicolas & San Carlos mining camp in the state of Tamaulipas, have been closed. This concession is owned by General Geronimo Trevino, and carries the same subsidy as the Monterey & Gulf. The road will tap one of the richest mining districts in Northern Mexico, and from the start has an assured tonnage, both from the copper camps of San Carlos and San Jose, and the high grade ores of San Nicolas. J. A. Robertson is the moving spirit in the enterprise. Work will shortly commence from the station of Garza Valley, on the line of the Monterey & Mexican Gulf."

**Michigan.**—A new railroad enterprise for which \$14,000 have been subscribed and seven directors elected, is to be called the Royal Oak, Southfield & Farmington R. Co. The money now raised will grade the road and lay the ties after which it will be bonded. The line, which will be more than 20 miles in length, will draw freight connecting with the Detroit, Grand Haven & Milwaukee at Royal Oak, and as there is now no road connecting the three towns mentioned in the title of the company it seems reasonable to expect that the scheme will pay.

**Ohio.**—The Ashland & Wooster R. Co. has been incorporated to build a railway from Sandusky to Cadiz, passing through the counties of Erie, Huron, Ashland, Wayne, Tuscarawas and Harrison. The incorporators are Horace A. Camp, Charles Baird, Aaron Wagoner, Wm. Buchtel and Thomas Walsh. Capital stock, \$100,000.

**Pennsylvania.**—The route for the new Butler & Pittsburgh road has been decided upon between the Allegheny river and a connection with the Pittsburgh, Shenango & Lake Erie at Butler—31 miles—and bids are asked until June 30 for the grading and masonry work between these two points. The route as agreed to will be from Butler along the Connoquenessing river to Renfrew, along Thorn and Deer creeks to the Allegheny river at Harmarville. Here the Allegheny river will be crossed by a high steel bridge. Between this point and the Monongahela river at Bessemer the route has not definitely been decided upon. The work on this first section is very heavy and includes considerable rock excavation and one tunnel 700 ft. long; the work also includes considerable masonry and six viaducts. The bridge over the Allegheny river will be 3,000 ft. long and 130 ft. above low water. The rest of the details of the bridge have not been decided upon. The total length of the line will be about 41 miles. Mr. F. E. House is chief engineer, and Mr. R. A. Franks, Carnegie building, Pittsburgh, is secretary.

A project is in hand to build a railway between Stroudsburg, Monroe county, and Wind Gap in Northampton county. The proposed line is via Saylorsburg and would shorten the distance between Stroudsburg region and Philadelphia about 26 miles. The Delaware, Lackawanna & Western reaches this section from the north and it is said that this road would make use of the new line for a Philadelphia connection. The Stroudsburg board of trade has undertaken to secure subscriptions of \$40,000 for the road. Among those interested in the enterprise are Chas. Broadhead, Bethlehem, Pa.; Col. John Jameson, Bloomsburg, and A. F. Baker of Norristown, a contractor.

**West Virginia.**—It is stated that the contract for the building of the New Martinsville & Clarksburg R. has been let to Contractor Bennett of Athens, O. The proposed line is to be standard gage and will be about 62 miles in length. It will form an almost direct line between the Ohio river and the oil fields near the center of the state. It is also reported that the West Virginia Central & Pittsburgh R. will extend its line from Elkins, W. Va., to Hunteville and finally connect with the new road, which will give it a new outlet to points in the west. Work on the new road will commence July 1.

#### CONVENTION EXHIBITS.

In last week's issue we gave a portion of the exhibits made at the Master Car Builders' Convention at Saratoga, N. Y., were noticed. The following are the remaining exhibits and also those made at the Master Mechanics' Convention.

The United Rubber Co. of Trenton, N. J., was ably represented by Mr. W. H. Robinson. This company has a very large railroad trade in air brake hose and other mechanical rubber goods.

Mr. Lon D. Sweet, general manager of the Sams automatic Coupler Co., had a neat working model of a pair of Sams automatic couplers and succeeded in capturing a number of orders for couplers. This coupler has been in use on a large number of cars for some time past and is meeting a favorable reception for use on work and gravel trains and also for equipping cars which are too nearly worn out to make it advisable to apply vertical plane couplers. This is the cheapest thing in the coupler line which complies with the requirements of the law, and its application to certain classes of cars is an excellent investment for railroads.

The Interchangeable Brake Beam Co., of St. Louis was represented by Mr. James Stewart, president of the company, and made an attractive and complete exhibit of brake beams.

The Springfield Malleable Iron Co. exhibited the Ludlow coupler and the Miner and Bryan draft riggings.

C. C. Jerome, of Chicago, made a good exhibit of Jerome metallic packing and also of new design of pneumatic blow-off cock which has some excellent points.

The Falls Hollow Staybolt Co., of Cuyahoga Falls, had a good exhibit of hollow staybolts and showed the good qualities of the iron used in them by broken and twisted samples.

A. H. Zenner, of Detroit, exhibited samples of disinfesting apparatus.

The Adams & Westlake Co. made an exhibit of window shades.

The Gisholt Machine Co. exhibited a tool grinder.

Henry Dietz made an exhibit of the "One Piece" draw bar.

One of the largest and most practical exhibits was made by the American Steel Foundry Co., of St. Louis. This company did not spare time or money in showing the product of its works, and among the samples on exhibition were found four complete freight car trucks, eighteen truck bolsters, a large assortment of couplers, cross-heads, locomotive frame, locomotive driving wheel, electric car truck frame, and body bolster for freight cars. All of these were in the condition in which they came from the sand. No attempt was made to cover defects or blow-holes as in fact there were none of any consequence to cover all the samples being excellent pieces of work. The company was represented by Messrs. Goltra and Robinson.

The McCoy Lubricator Co., of Detroit made an exhibit of lubricators.

The Junction Iron & Steel Co., of Mingo Junction, Ohio, was represented by Mr. W. H. Eaton, general sales agent.

The Buckeye Coupler Co., of Columbus, made a very good exhibit of the Buckeye coupler and was represented by Messrs. Howe and Timms.

The Mason Regulator Company of Boston, Mass., exhibited the Mason steam pump, the Mason damper regulator, locomotive reducing valves, car heating valves, air brake regulators and stationary reducing valves. Messrs. W. B. Mason and W. T. Johnson were in charge.

The Schenectady Locomotive Works was represented by Mr. Edw. Ellis, president; A. J. Pitkin, superintendent; A. M. White, assistant superintendent, and J. E. Sague, mechanical engineer. This company tendered the master mechanics an excursion to their works on the afternoon of the 23rd, which was much enjoyed by all who participated.

The Allison Manufacturing Company of Philadelphia, was represented by Mr. J. O'Neil, treasurer.

The Keasby & Mattison Company of Ambler, Pa., had a quarter size imitation locomotive boiler covered with their magnesia sectional covering, 2½ in. thick, and it made an excellent impression on all who saw it.

The Woolstencroft Pneumatic Tool Company of Philadelphia, displayed their pneumatic hammers in operation.

The Eastwood Wire Mfg. Company of Belleville, N. J., showed their patent valves.

The new pressed steel car truck frames of the Schoen Pressed Steel Company of Pittsburgh, attracted much attention, as did also their truck and body pressed steel bolsters.

The Smith Triple Exhaust Company of Doylestown, Pa., was represented by John T. Smith and Henry Lear.

The Jenkins Valve Company of New York was represented by J. D. Stiles.

The Richmond (Va.) Locomotive Works was represented by Mr. T. M. Gentry.

Mr. A. C. Ashton, superintendent of the Ashton Valve Company of Boston, spent a few days at the meeting.

The Ball Bearing Company of Boston showed their application of the Hub anti-friction ball bearing for general machine construction, under the charge of Mr. W. S. McGowan, general sales agent.

Mr. E. S. Marshall, representing the Western Railway Equipment Co., had an exhibit of the Houston track sander, which attracted much attention owing to its simplicity and perfect adaptability to any and all types of locomotives.

One of the most complete exhibits on the grounds was made by the Moran Flexible Joint Co. of Louisville, Ky. This exhibit contained sample joints in sizes ranging up to one for use in a 10 in. pipe, and included joints which had been in constant use for two years without showing any signs of wear. A steam coupling for railway steam heating equipment was also exhibited and attracted much attention owing to its simple construction and thorough effectiveness.

There were no exhibits at the convention which attracted more attention and created more talk than those of the steel cars exhibited by the Universal Construction Co. of Chicago, and the Carnegie Steel Co. of Pittsburgh. These cars were placed on a siding in the depot yards of the D. & H. Ry., and at all hours of the day there were visitors inspecting them. The consensus of opinion expressed seemed to be that steel cars would soon be very

extensively used, and one of the most common topics of conversation about the hotels was the details of the designs exhibited. The Pennock underframe received many complimentary criticisms, and even the most conservative were ready to admit that it was a first-class design.

The exhibit of the National electric headlight, made by Royal C. Vilas, was visited by a large representation from the convention, and those who had never seen the light were completely astonished at what they saw. Two or three superintendents of motive power announced their intention of at once ordering some of the lights, and others expressed their intention of investigating it carefully.

The Westinghouse friction draft gear was one of the exhibits which was carefully inspected. This draft gear has been radically changed since it was first on the market, and many complimentary remarks were passed upon it.

The Westinghouse Air Brake Co., of Pittsburgh, is well represented by Messrs. R. A. Parke, Geo. F. Evans, F. M. Nellis, Robt. Bridges, and E. L. Adreon.

Mr. A. O. Norton the "jack man" was also on hand to tell why the Norton jack is ahead of all others.

Mr. Clarence E. Rood of Buffalo, N. Y., the proprietor of the Rood Malleable Iron Works, at Lancaster, N. Y., enlivened the occasion by his presence and shook hands with his many friends who always are glad to see him. He was accompanied by his general manager, Eugene Chamberlain, who has been mentioned by some papers as possessing silver eloquence. This must not be misunderstood, as Mr. Chamberlain is a gold man, although when his golden silence is once broken a silver stream of eloquence is sure to flow.

The Shirra Car Seal Co., of Pittsburgh, made an exhibit of their seals for the first time.

The New York Car Coupler Co. made an exhibit of a pair of their couplers under the charge of Mr. John LaBurt.

Mr. C. Hammett, of Troy, N. Y., showed an air locomotive bell ringer and an automatic locomotive oiler.

The Brown Car Wheel Works, of Buffalo, were represented by Mr. Geo. M. Trefts and Mr. Henry M. Brown.

The Brooks Locomotive Works, of Dunkirk, N. Y., was represented by Mr. R. J. Gross, vice president, F. H. Stevens, assistant to the president. Mr. H. Tandy, assistant superintendent.

Mr. James H. Sewall, of Worcester, Mass., showed his automatic brake slack adjuster as applied to cars. Mr. Sewall has won golden opinions from all present for his untiring efforts in behalf of others.

Mr. O. P. Letchworth, president the Pratt & Letchworth Co., of Buffalo, put in an appearance and added to the jollity of the occasion. The Ashton Valve Co. of Boston, was represented by Mr. Fred A. Casey, vice president.

Mr. F. A. Barbey, of Boston, showed the Hampson Flexible Steam Joint.

The Crosby Steam Gage & Valve Co., of Boston, had a display of steam gages and valves under the charge of Mr. Edward C. Bates.

Detrick & Harvey Machinery Co., of Baltimore, displayed bolt cutting machinery under the charge of Mr. T. M. Brown.

The Hale & Kilburn Mfg. Co., of Philadelphia, showed some veteran car seat cushions which had successfully withstood the wear of the public for over 14 years.

The Bushnell Mfg. Co., of Easton, Pa., was represented by Mr. E. M. Bushnell, general manager.

The Kinzer & Jones Mfg. Co., of Pittsburgh, showed their new brake shoes, and was represented by Mr. J. J. Kinzer, Jr., and Wm. Weirbach.

The Revere Rubber Co., of Boston was represented by W. B. Miller, manager, and Geo. I. Hill.

Edward Smith & Co., of New York, showed the application of the "baked" system of preserving locomotives and metals. Mr. Arthur Johnson and E. H. B. Twining were in charge.

Clarence Whitman & Co., New York, showed the Pantasote substitute for leather. Mr. H. E. Twining was in charge.

Wm. Yerdon, of New York, showed the Yerdon improved double hose band.

#### INDUSTRIAL NOTES.

##### Cars and Locomotives.

—Five new passenger engines are being built at the Baldwin Locomotive Works for the Lehigh Valley's "Black Diamond Express." They are the "Mother Hubbard" type, and will be equipped with the most modern appliances for acquiring and maintaining the fastest railroad speed. In weight they will be somewhat heavier than the engines now in use on that road. It is expected that these engines will be completed and delivered in a few weeks.

—The Wagner Car Company has just completed eight new coaches and six drawing cars of the most elegant design, to be run on the New York Central between New York and Montreal, over the Adirondack & St. Lawrence division.

—The Railway Times, of London, England, says: Some new engines are being turned out by the Northeastern Railway Company for the east coast passenger service. They are admirable models of engineering skill, and the largest in England. The cylinders are 20 in. in diameter, and have a stroke of 26 in. The coupled wheels, 4 in number, are 7 ft. 7½ in. in diameter and 9 ft. 6 in. apart. The front part of the engine is carried on a 4-wheeled bogie. The boiler is 4 ft. 4 in. in diameter, and over 11 ft. long. The fire-box is 7 ft. long. The center of the boiler from the rail is over 8 ft. The engine weighs 50 tons, and the tender 40 tons. Mr. Wilson Worsdell, the designer of the engines, made a trial trip to Berwick, and had no difficulty in maintaining a speed of 70 miles per hour.



—The Chicago, Burlington & Quincy Railroad have ordered 1000 stock cars, the Michigan Peninsular Car Co., of Detroit getting 750, and Wells, French & Co., of Chicago, 250.

—The Georgia Railroad has ordered 300 box cars from the Ohio Falls Car Co.

—The two fast passenger locomotives built by the Baldwin Locomotive Works for the Chicago, Milwaukee & St. Paul Railroad have been delivered and are now in service.

#### Buildings.

—The International & Great Northern Railway car sheds and roundhouse at Laredo were burned on June 15, together with two coaches, combined baggage and mail car, Pullman palace sleeping car and engine No. 60. The loss is estimated at from \$60,000 to \$100,000.

—The Erie Railway Company is reported as making arrangements for constructing a passenger station at Wilson ave. and Track st., Cleveland, O.

—The new station to be erected by the Cleveland, Cincinnati, Chicago & St. Louis at East St. Louis, Ill., will cost about \$40,000, and the roundhouse will cost an additional \$15,000. They are to replace the structures demolished in the recent storm at St. Louis, but will not be rebuilt on exactly the same site. It is stated that the total cost of the improvements will be about \$65,000.

—The new union depot at Columbus, O., will cost upward of \$600,000. The Guaranty Construction Company, of Chicago, are the contractors, and the superintendence will be directly in charge of Theodore Starrett, vice president of the company. The length of the depot will be 487 ft. by 85 ft. wide. A concourse 200 ft. in length will connect the depot with the viaduct which crosses the tracks at this point, and on which will be constructed 857 ft. of stores. The entrance to the concourse from the viaduct will have a large Roman triumphal arch at either end—over 100 ft. from the tracks to highest point. The Corinthian order is used. The stores will be constructed of Roman brick and elaborately trimmed with terra cotta. The same general design of the Roman classic in the depot will be followed throughout. The interior of the depot is highly treated in foreign marbles and mosaics, the ground floor being used for waiting rooms, etc. The spacious offices of the company will occupy the second floor. The depot will be constructed with granite base, Roman brick and terra cotta walls and red tile roof.

—The Louisville and Nashville Railroad Company has definitely decided to erect the depot proposed at Montgomery, Ala. It is to cost \$350,000, and will be three stories high, constructed of brick, stone and iron, 309 ft. long; trainshed 600 ft. long, and freight depot 50x400 ft.

—The Georgia Southern & Florida Railroad has ordered plans prepared for a \$30,000 depot at Macon, Ga., the buildings to comprise offices, depots and warehouses.

—Referring to the new car shops which the Merchants' Dispatch has decided to build at Penfield, N. Y., the Buffalo Courier says: The site selected is on the line of the New York Central, with a track frontage of 1,800 ft. The buildings will be constructed of brick and iron, and will consist of a main building, 125x600 ft.; another 125x300 ft.; machine shop, 100x200 ft.; a general storage house, 60x300 ft.; together with a paint shop, blacksmith shop, power house, and detached office building. At this plant will be concentrated the work of keeping in repair the upward of 10,000 cars owned and operated by the company, and ultimately the building of cars will be facilitated. The company owns the Wickes refrigerator patents, and owns and operates all the cars constructed under these patents. Heretofore the work of the Merchants' Dispatch has been done at Buffalo, Depew and other points. Its contract with the land syndicate calls for the abandonment of all work at other points, the entire plant to be located at Penfield. Heretofore less than one-third of the repair work of the company has been done at the Rochester shops. The new plant when in operation, which it is stated will be some time during the coming fall, will give employment to upward of 1,000 men, and it is expected that the shops will form a nucleus for a thriving industrial community.

—The Jacksonville Terminal Company's new depot, recently mentioned is to be a brick and granite structure 361x131 ft., with train shed 1000 ft., long, and be heated by steam and lighted by electricity. The contract has been let to S. S. Leonard, Pensacola.

—The Philadelphia & Reading has awarded to Richard Kearns of Bridgeport, Pa., the contract for the erection of a brick roundhouse in that borough, to cost about \$7,000. A machine shop, 80x150 ft., will be built on the same site.

—The grade crossings committee of the Haverhill, Mass., council is reported to have voted June 11 to engage an expert to prepare plans for an elevated depot at that place, to be submitted in a few weeks, and steps toward the abolition of the crossings will then be taken.

—The Georgia Car & Manufacturing Co. of Savannah, Ga., of which mention has already been made, will erect buildings as follows: Engine and boiler department, 75x106 ft.; machine, blacksmith and truck department, 106x375 ft.; office, warerooms and pattern and wood shop, 106x150 ft.; passenger dressed lumber department, 106x125 ft.; passenger erecting department, 106x500 ft.; lumber wharf, 500x106 ft.; planing mill, 106x500 ft.; dressed lumber department, 106x150 ft.; freight truck department, 76x106 ft.; freight erecting department, 106x600.

—The Nashville, Chattanooga & St. Louis Railway has placed contracts for improvements to its depots, etc. The

Colyar Bridge Co. has the iron work at \$3,400, and the Edgefield & Nashville Manufacturing Co. the interior work at \$7,800.

—The Seaboard Air Line will rebuild at a cost of from \$200,000 to \$300,000 the machine shops, car shops, etc., recently burned. It has not yet been decided whether the new plant will be located at Raleigh, Henderson, N. C., Hamlet, N. C., or Portsmouth, Va.

—The Florida Peninsular Railroad Co. will build a depot at Lakeville, Fla.

—The Fox Pressed Steel Co., Pittsburgh, has taken out permits for its new buildings consisting of two shops and a two-story brick office building. The shops are to be of iron and one-story high. One is to be 60x283 ft. and to cost \$15,000, and the other 112x439 ft., to cost \$25,000. The plant will be located on Fifty-third street.

#### Bridges.

—We are informed that the contract for the iron superstructure for the bridge over the Quinnipiac river at Grand street, New Haven, Conn., has been let to the Berlin Bridge Co., East Berlin, Conn., for \$56,451. There are to be four fixed spans of about 55 ft. each, and a swing span 210 ft. long. Width, 52 ft. between railings. Brick paving on roadway and asphalt on sidewalks. The bridge is to be operated by electric motors.

—Press reports state that plans for the new bridge of the Yankton & Norfolk Railroad Co. at Yankton contemplate five pneumatic piers, an iron framework 1,000 ft. long, and approaches 1,500 ft. in length. The bridge is intended exclusively for railway traffic and will cost about \$500,000. The substructure will be built by Alfred Noble of Chicago, Ill., and the superstructure by the Missouri Bridge & Iron Co., of Leavenworth, Kan. N. D. Miller, engineer.

—Proposals will be received until July 25 for the construction of an iron and steel bridge, of two steel spans 100 ft. long, with three stone piers, over the Chattahoochee river at Strickland, Ga. H. L. Hawkins, Cumming, Ga., may be addressed.

—The board of freeholders of Middlesex county, N. J., have authorized \$12,500 to be placed in the budget for the coming year, to pay for the construction of a bridge over Cheesekakes creek.

—Bids will be received for the erection of the new bridge for the full width of Fourth street, Atchison, Kan.

—The Baltimore & Ohio Railroad Co. has let contract to Talbot & Bennet of Pittsburgh, Pa., for the construction of an iron bridge at Little Seneca about 500 ft. long; will cost about \$100,000.

—The county commissioners have voted to advertise for bids for constructing a steel bridge 232 ft. long over Ninescal river at Nickerson Ford, Wichita, Kan.

—The Duluth Superior Bridge Co., of Duluth, Minn., has advertised for bids for building the bridge between Duluth and West Superior. The total length of the bridge including approaches, will be 1,300 ft., and the width 58½ ft. There will be two fixed spans of 302 ft. each and a draw span of 483 ft. It is said that the turning power will be electricity.

—The joint committee of the park commissioners, the Glenville council and the Little Consolidated Street Railway Co., Cleveland, O., has decided to direct the engineers to prepare plans for a new bridge on St. Clair street.

—County Commissioners have decided to build new iron bridges over the Jim river at Hecla, So. Dak., and on the Spink county line.

—At a recent meeting of the Water Street Bridge Co., the directors decided to erect a new iron and steel bridge this summer in Pittston, Pa. Contracts not yet let.

—Bids will be received until July 7, for the erection of a bridge over Captina creek near Steinersville, Ohio.

—Plans and specifications have been prepared for a new iron bridge across the lake inlet on the Gilmore road, Winona, Minn.

—The Phoenix Bridge Company has about completed the structural material to replace the old high wooden bridge at Tamaqua with a fine steel structure. This famous bridge was built in 1867. It is 152 ft. high and 1,100 ft. long. It was so built that it can be taken apart without interfering with railroad traffic. It spans a gulch and creek of the Nesquehoning Valley Railroad. The new bridge will be a handsome one, and it will take 2,000 tons of structural material to erect it.

—Bids will be received until July 15, for the construction of a highway bridge across the Arkansas river at Main street, in Little Rock, Ark.

—The Duluth & Iron Range Railway have let the contract for the construction of two steel plate girder deck bridges over Talmadge and French rivers to the Lassig Bridge & Iron Works of Chicago. One is to be 158 ft. in length and the other 124 ft. Heavy bridge masonry foundations are now being constructed of Kettle river sandstone. These are designed to carry 120 ton engines and will cost complete about \$11,500. The five bridges noted in the issue of January 25 last, are completed, and after a careful inspection will be tested for loads, the 120 ton engines will be used for making the tests.

#### Machinery and Tools.

—The Newton Machine Tool Works of Philadelphia has received a large order from the new Russian Locomotive Works, included in which are many heavy milling machines, cold saw cutting-off machines, boring machines, etc.

—The Schoenberger Steel Co., of Pittsburgh, Pa., is adding a 22-ton electric crane to its continuous mill.

—The Columbia Iron Co., of Columbia, Pa., is to install a lot of rolling mill machinery, together with boilers and engines.

—Mr. J. T. Wilson, general manager of the American Balance Slide Valve Co., has just received a report from the representatives of the valve in Germany to the effect that three hundred valves have been put in on that principle in that country during the past six months. At the time of the previous report in January, the number in use was twenty-six.

#### Iron and Steel.

—On June 11 Mr. Henry W. Oliver was finally discharged from the receivership of the Oliver Iron & Steel Co. of Pittsburgh. About a year ago Mr. Oliver asked to be discharged, and since that time the business of the concern has largely been in charge of the men selected by the stockholders. The financial troubles which overtook it some three years ago have been satisfactorily overcome and the concern placed upon a solid financial footing. Plans for the improvement of the South Side plant have been completed. An addition to a Bessemer plant is to take the place of the old Clapp-Griffiths open-hearth plant. Workmen are engaged in tearing out the old furnace at the Thirteenth street mill, and the converters of the new Bessemer plant will occupy this space. The old blooming mill will be replaced with one of the most modern type. The continuous mill, upon which work has been going forward for some months, was put in operation last week, and has been found to work satisfactorily. The galvanizing department is also being enlarged to almost double its present capacity.

—The Union Trust Co., which was recently appointed receiver of the Union Steel Works of Alexandria, Indiana, has posted a notice that it will at once put the plant in full operation. The appraisement shows \$232,258.71 assets, with liabilities but a little over \$100,000, including the \$50,000 bonded indebtedness.

—The Richmond Bolt & Nut Works, at Richmond, Va., which has been idle several months, will resume operations shortly. When in full operation it employs 150 men.

—The reorganization of the Otis Steel Co., of Cleveland, O., which was placed in the hands of the receivers about a year ago, has been completed, and the receivers have turned the property over to the reorganized company. Mr. P. J. Benbow, the former general manager, and who was managing receiver, has been appointed general manager of the new company.

—The Tennessee Coal, Iron & Railroad Co., referring to a reported sale of pig iron for shipment to Genoa, Italy, states that the report grew out of the shipment of a single sample car, via Genoa, to another point, to a concern whose trade amounts to 50,000 tons per annum, which it were hopeful of being able to secure if he liked the iron and suitable freight rates could be arranged. This company has made various shipments to Genoa, either for its own account or that of various customers, the largest one of which was 500 tons.

—The plant of the Union Steel Works, at Alexandria, Ind., has been put in full operation, with a force of 500 hands.

#### Miscellaneous.

—The board of directors of the Westinghouse Air Brake Company has declared the regular quarterly dividend of 5 per cent and an extra dividend of 5 per cent, both payable to stockholders of record on July 10.

—Contracts have been let by the Philadelphia & Reading for the construction of a large additional coal pier at Port Reading. It will be 700 ft. long and 50 ft. wide, and will be separated from the present wharf by a dock 200 ft. wide. The new pier will have three tracks, the third being intended to return the empty cars by gravity. The dock will be dredged to a mean depth of 18 ft. at low water. The contract for the new pier has been awarded to Joseph H. Cofrode, formerly of the bridge building firm of Cofrode & Saylor. The dredging will be done by J. Sanford Ross, of Jersey City. This pier will enable the company to increase its facilities for handling its tidewater coal, and is in pursuance of the plan to ship coal for New York and New England tidewater points over the Plymouth branch, and thence over the Bound Brook road to Port Reading. By making Port Reading the distributing point for this traffic a considerable distance in vessel haul will be saved.

—The board of directors of the Westinghouse Machine Company declared a quarterly dividend of 1½ per cent on the preferred and common capital stock of the company, payable July 10, 1896, to stockholders of record, July 1, 1896.

—The Johnson Company, of Lorain, O., and Johnstown, Pa., has acquired the sole manufacturing and selling rights for the C A C tie plate, formerly handled by the Standard Railroad Equipment Company, of New York City. It is understood that the company has investigated the plate thoroughly and developed it in several directions. A new method of rolling in its manufacture will be applied. The Johnson Company has great manufacturing and business facilities and experience, and will doubtless push this plate with energy. Mr. Floyd K. Smith is in charge of this branch of the business of the company.

—The American Hoist & Derrick Co., are doing a good business in their hoisting engines and are constantly in receipt of letters from contractors, builders and others as to the efficiency of the machines. The George A. Fuller Co., of Chicago, pronounce them the best they have ever used.



